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INTERSTITIAL PREGNANCY

By H. M. N. Wynne,

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Ectopic pregnancy in the interstitial portion of the Fallopian tube is of especial interest on account of its infrequency and from the standpoint of diagnosis.

Several authors have given Pierre Dionis credit for being the first to describe a case of interstitial pregnancy, published in 1718 in his *Traité Général des Accouchements.* We find, however, that Dionis cites cases of tubal pregnancy he had seen with a drawing of one specimen, in which the fœtus lay in the ampulla of the right tube, and discusses Mauriceau's famous case, in which he says the fœtus was formed in the extremity of the tube which terminates in the uterus. ("Tous ceux qui ont examiné ce fait, sont convenus que cet enfant avait été formé dans l'extrémité de la rompe qui aboutit à la matrice, et ont été conformés dans l'opinion des oeufs.") According to Dionis, Mauriceau claimed that this fœtus had been formed in the uterus and said that he would never accept any case of tubal pregnancy because they contradicted his theory and doctrine of generation.

Mauriceau's case, which he saw at autopsy with Benoît Vassal and others, was that of a woman of 32 years, who had given birth to 11 full-term babies, and during the third month of her twelfth pregnancy died after having had violent abdominal pain, fainting attacks and convulsions for three days. This case was the basis of a long and heated discussion carried on between Mauriceau and Graaf, Dionis and other less celebrated men, who believed it, with Vassal, to be a tubal pregnancy. As we have seen, Dionis held that it was of the interstitial variety. The drawing published by Mauriceau illustrates very well a pregnancy in a rudimentary horn, although the author described it as a hernia of the uterine cornu. Mauriceau takes pains to explain that his drawing was the only correct one, as Vassal's was constructed from memory over a month after the autopsy and had been changed by others, who had copied it, to agree with their ideas.

Schmidt (1801) is generally credited with having reported the first authentic case. A treatise on this subject, with a discussion of four cases, was published in 1825 by Mayer. Brechet reported cases in 1826—Hedrick's, Bellemain's, Schmitt's and Dance's (Simon).

The first case reported by an American was by R. H. Fitz, of Boston, in 1875. The specimen, having been obtained at autopsy, was presented to him by A. T. Davison, who also

furnished the clinical history. Fitz published drawings and a careful description of the specimen after reviewing the literature, from which he accepted 18 cases. In 1885 Simon analysed the 40 cases reported to that time, nine of which he considered undoubtedly true interstitial, nine as doubtful and the remaining 24 as ectopic pregnancies of other types. Werth, in 1904, considered 40 cases above criticism, but Weinbrenner in the same year believed that five of these were not to be allowed.

Since these reviews, additional cases have been collected from the literature or reported by the following: Finsterer, 17 cases in 1908; Lequeux, 12 cases in 1911; Schenk, 19 cases in 1912, and Farrar, 10 cases in 1914. Of these reports, there are several overlapping, as Schenk gives seven previously mentioned by Lequeux and Farrar, one of which was reported by Schenk. We have not attempted to review the individual cases cited by these several authors. If all were to be allowed, the total to 1914 is 85 cases. The subject hs been discussed very thoroughly, and references to a fairly large literature have been given by the authors mentioned above.

OCCURRENCE

The percentage of interstitial pregnancies in all types of ectopic gestation is usually stated as 3 per cent. This is based on the work of von Rosenthal, who collected from the literature 1324 cases of all types before 1896 and 40 cases of interstitial pregnancy reported during the same time. According to the more recent works of Werth and Weinbrenner, there were considerably less than 40 cases of true interstitial pregnancy at that time.

We believe that a more accurate method of determining the percentage is to total several series from the larger clinics, in which careful differential diagnoses have been made. These figures are as follows:

	Cases
Baculescu reported one interstitial in a series of	58
Finsterer reported one interstitial in a series of	133
Kastaneff (Wasten's clinic) reported eight interstitial in a series of	335
Krivsky reported two interstitial in a series of	223
Lahostky reported two interstitial in a series of	150
Mandl and Schmidt reported no interstitial in a series of	77
Martin reported one interstitial in a series of	77
Tait reported one interstitial in a series of	100
Werth reported no interstitial in a series of	120

In this clinic there have been 304 cases of ectopic pregnancy operated on, only two of which can be classed as interstitial. In a total of 1547 cases of ectopic pregnancy, there are 18 cases of interstitial pregnancy (1.16 per cent).

CLASSIFICATION

The classification and differentiation of interstitial pregnancy have been thoroughly discussed by Weinbrenner, Kohlmann and Lequeux. The implantation of the ovum must be in the interstitial portion of a tube, including diverticula from the tube, extending into uterine muscle. But in view of the fact that the development of the embryo may change anatomical relations to some extent, various classifications have been proposed; that of Klebs will cover most of the conditions found at operation and is as follows:

(1) Graviditas utero-interstitialis,
(2) Graviditas tubo-interstitialis,
(3) Graviditas interstitialis propria.

DIAGNOSIS

The distinguishing details of the differential diagnosis between this type and pregnancy occurring in other portions of the tube or in a rudimentary horn may be found tabulated in Farrar's paper.

Virchow noted that the round ligament is always outside of the gestation sac. The insertion of the round ligament is usually lateral and inferior or anterior and inferior to the gestation sac. Glaesmer says that in his case the round ligament was medial to the sac and discusses this phase of the diagnosis at length. Lequeux says that the variations in the insertion of the round ligament are due to the variety of implantation and to the evolution of the ovum. The relation of the proximal end of the tube to the gestation sac is subject to variation also. The tube is usually inferior, but can be more or less lateral according to the development of the ovum. Von Rosenthal believed that the tube was always inserted into the inferior border of the gestation sac.

According to several more recent papers Ruge's sign is not always present. This sign, as stated by Simon, is that the distance between the insertions of the tube and round ligament is increased and the adnexa of the affected side are higher than on the other side, owing to the increase in size of the pregnant horn and some rotation of the uterus following this asymmetrical development. A positive diagnosis of interstitial pregnancy before operation is, we believe, very unlikely. Kelly described a type of apical pregnancy which may be mistaken for the interstitial variety, in which there is often severe pain; and on examination the softening and enlargement of the uterus is confined to one apex, even as late as the fifth month, but these terminate normally. He also states that they may be interstitial pregnancies with the ovum lodged very near the uterine cavity and become intrauterine secondarily, although he does not interpret them as such.

There are also early isthmial pregnancies developing very close to the uterine cornu, difficult to diagnose at operation. In this clinic the diagnosis at operation in seven cases has been cornual pregnancy, but on careful histological study only two have proven to be interstitial in origin.

Pregnancy in one horn of a bicornuate uterus may in certain cases present a serious difficulty in making the differential diagnosis, as also can a small myoma in one cornu or a unilateral cornual abscess, especially when associated with the retained membranes of an early abortion.

Sturmdorf made a diagnosis of ectopic pregnancy on the right side, but at operation the right-sided mass proved to be a tubo-ovarian abscess, and in the left cornu, which was thought to be normal, there was an early interstitial pregnancy.

Robin's case was diagnosed ectopic pregnancy or acute appendicitis, and an exploratory McBurney incision made to deter-

mine the exact condition. In the case reported by Schenk, the pre-operative diagnosis was correct and the pre-operative diagnosis in Schumann's case made by Hirst proved to be right.

Lewers considers persistent amenorrhœa a very important sign in the differential diagnosis. Our investigation of 36 cases showed that amenorrhœa was persistent in 12, the periods were quite regular in two and irregular bleeding occurred in 22 cases, although it was very slight in five of these.

Siefart claims that no interstitial pregnancies are seen after the sixth month; but Ferguson reports a case which he considered primarily interstitial and secondarily abdominal, operated on by him at term, but his report is too incomplete to establish the diagnosis above criticism. Cases have been reported in which an 8-month fœtus was found by Kupferberg and a 7-month fœtus by Glaesmer. Pegaitaz performed a supravaginal hysterectomy for myomata on a patient who had shortly before given birth spontaneously to a 6½-month fœtus. On examining the uterus, he found the placenta in the interstitial portion of the tube.

Beckmann and Siefart believe that perforations always occur on the posterior convex surface of the gestation sac. In 20 cases in which we have found the site of rupture mentioned, it is described as on the posterior surface in eight, on the posterior superior surface in five, on the posterior lateral surface in one, on the superior surface in three, on the superior anterior surface in two, and on the anterior surface in one. This last-mentioned case was exhibited in 1903 by Seitz.

Rupture generally occurs during the first half of pregnancy. There is at present a considerable number of patients in the literature who were operated on before rupture had occurred. The statistics are as follows:

Month	Ruptured			Cases since 1908	Ruptured	Operated on Unruptured
	Simon	Werth	Finisterer			
1.....	..	1	..	2	2	2
1-2.....	..	3	2	4	9	4
2.....	2	4	3	5	14	4
2-3.....	..	6	1	2	9	1
3.....	5	4	1	3	13	2
3-4.....	..	2	..	1	3	2
4.....	2	4	..	..	6	4
4-5.....	..	4	..	..	4	..
5.....	..	3	1	1	5	..
5-6.....	..	1	..	..	1	..
6.....	..	..	..	..	..	..
7.....	..	..	..	2	2	..
8.....	..	..	..	1	1	..

These statistics show that the most usual time for rupture is during the second and third months. The statistics of Baart de la Faille, Henning and Parry (quoted from Eckert) show that rupture occurs most frequently between the third and fifth months. The tables given above, however, include cases that have been more strictly criticised than those of the authors mentioned, as well as the recent cases.

There have been two other cases reported as unruptured, but the age of the fœtus was not stated. The total number of cases up to 1917 is about 91, and 21 of these were unruptured (about 23 per cent).

The ages of the patients in 38 cases are as follows:

Years	No. of patients	Years	No. of patients
21.....	1	31.....	2
24.....	2	32.....	1
25.....	4	34.....	4
26.....	1	35.....	3
27.....	3	36.....	2
28.....	6	39.....	1
29.....	3	40.....	2
30.....	2	41.....	1

The decade between 25 and 35 years shows the greatest number of cases.

In a series of 42 cases the numbers of pregnancies prior to the interstitial pregnancy are as follows:

No. of pregnancies	No. of cases	Miscarriages
0.....	5	
1.....	13	1 (induced).
2.....	11	2 pts. had 1 each, and 1 pt. 2 (induced).
3.....	5	1 patient had 1.
4.....	4	1 patient had 2.
5.....	2	
9.....	1	7 miscarriages.
16.....	1	2 miscarriages.

The time elapsing after the last pregnancy before the interstitial pregnancy in 19 cases was as follows:

Time	No. of cases	Time	No. of cases
2 months.....	1	4 years.....	1
7 months.....	1	5 years.....	1
11 months.....	1	6 years.....	1
1 year.....	2	7 years.....	1
16 months.....	1	11 years.....	1
2 years.....	1	13 years.....	1
2½ years.....	1	14 years.....	1
3 years.....	4		

CAUSE

Conditions that bring about the abnormal embedding of the ovum in other portions of the tube are doubtless responsible for the occurrence in this portion as well. Dionis (1718) argued that the interstitial part of the tube should be the seat of tubal pregnancy more often than any other part of the tube; owing to its smaller calibre, however, there are fewer folds of the mucosa in this section and the lumen is less encroached upon by inflammatory changes than at any other part of the tube. Frankl considers the presence of diverticula of the utmost importance as a cause of interstitial pregnancy.

We shall not repeat the numerous theories advanced to explain the cause of tubal pregnancy, as they have been discussed in many of the papers on this subject.

Scott believes previous curettage responsible for some cases, but this theory is difficult to uphold, as, in curettage of the uterine cavity, the apices are practically never injured; this can be demonstrated by opening a uterus removed immediately after a careful curettage.

Nache attempted to sterilize a woman by making a wedge excision of the tubes from the uterus, but four months later was obliged to perform a laparotomy for an interstitial pregnancy.

The right tube and ovary were absent and the right uterine cornu was the seat of an interstitial pregnancy in a case operated on by Andrews.

TREATMENT

The first operation for insterstitial pregnancy was performed on October 15, 1893, by Traub, who did a supravaginal hysterectomy, and on October 23, 1893, Lawson Tait operated on a case by incising the sac, evacuating the contents and draining. Since that time the treatment of choice has been operative, as soon as a diagnosis has been made which indicated operative interference, and in the great majority of cases this has been done after rupture of the sac. Immediate operation is most important in this type of ectopic pregnancy on account of the enormous hæmorrhage that almost always follows rupture and the small chance that the bleeding will cease before the patient is moribund.

A great variety of operations have been done for this condition. In 66 cases the following operations have been performed:

VAGINAL

	Times
Panhysterectomy	1
Wedge excision of cornu	1

ABDOMINAL

	Times
Panhysterectomy	2
Panhysterectomy with double salpingo-oöphorectomy	1
Supravaginal hysterectomy	17
Supravaginal hysterectomy with drainage	1
Resection of uterine cornu	8
Resection of uterine cornu with salpingectomy	1
Resection of uterine cornu with salpingo-oöphorectomy	1
Resection of uterine cornu and digital cleaning of uterine cavity from above	1
Resection of uterine cornu and curettage of uterine cavity from above	1
Excision of uterine cornu with salpingo-oöphorectomy	2
Excision of gestation sac	9
Excision of gestation sac with salpingectomy	1
Excision of gestation sac with salpingo-oöphorectomy	4
Wedge excision of cornu	8
Wedge excision of cornu with salpingo-oöphorectomy	2
Incision of gestation sac, evacuation of contents and drainage	1
Cleaning out sac and suture of wound	2
Cleaning out sac and suture of wound, with drainage through the uterus	1
Dilatation and curettage followed by laparotomy, with incision into sac, evacuation of contents, uterine cavity opened, suture of wound, myomectomy	1
Dilatation of cervix and removal of intrauterine ovum with forceps, followed by laparotomy with a wedge excision of the cornu, uterine cavity not opened	1

The abdominal route has been used in all but two cases and undoubtedly is the best. The type of operation must be selected to fit the emergency, as in the more advanced cases hysterectomy is usually preferred and in the earlier cases excision of the cornu with suture usually can be done more quickly. Speed is almost always to be considered, as the majority of these patients are in bad condition.

Schurmann's patient was treated expectantly for three weeks, when, on account of continued pain, the uterus was explored digitally, the gestation sac broken into, a 4-month fœtus with the placenta was removed and the uterine cavity curetted.

Farrar, following Kelly's suggestion, after having opened the abdomen and finding no rupture, curetted the gestation sac from below, guarding against puncture with one hand in the abdomen.

The interval between the onset of acute symptoms and operation has been as follows:

Ward's case	4 hours.
Polak's case	4-5 hours.
Glaesmer's case	6½ hours.
Siefart's case	7 hours.
Kohlmann's case	11 hours.
J. H. H. Gyn. No. 20777	12 hours.
Nacke's case	24 hours.
Lequeux's case	24 hours.
Funke's (Kühlmann) case	36 hours.
Andrew's case	3 days.
Weinbrenner's case (1)	14 days.
v. Holst's case	14 days.

Muret's case had ruptured some time before and closed off by intestinal and omental adhesions; the fœtus was four and one-half months old.

Cullingworth's case ruptured at the third month; the operation was done five months after conception; the fœtus had been dead some time before the operation.

Treub's case ruptured at the third month, secondary abdominal pregnancy developed, fœtus measuring 41 cm. when removed.

Farrar's case unruptured; severe vaginal hæmorrhage a few hours before operation.

J. H. H. Gyn. No. 15342, unruptured; hæmorrhage through tube into abdomen; onset 16 days before operation.

PROGNOSIS

All authors agree that the prognosis in this type of ectopic pregnancy is extremely grave. Werth in a series of 31 operated cases found four deaths; Finsterer, two deaths in 17 cases; Schenk, four deaths in 19 cases (no operation in two cases). Lequeux reports two deaths in five cases (no operation in one case) and Farrar 10 cases with one death, while in the five undoubted cases since the latter's paper there were no deaths. (Two of Schenk's cases included in Lequeux's report (one death) and one of Farrar's cases reported by Schenk.) In 82 operative cases there were 10 deaths or a 11.9 per cent mortality with operation.

Prior to 1893, all the cases in the literature had been found at autopsy. Of the nine undoubted cases analysed by Simon in 1885, the time from the onset of symptoms due to rupture until death was less than 12 hours in two cases, less than 24 hour in four cases, 27 hours in one case and 15 days in one case.

Wagner's patient (Case III) died 17 hours after an acute onset, while being prepared for operation. A 6-week fœtus was found at autopsy.

Kupferberg's patient died 48 hours after an acute onset, while being prepared for operation. At autopsy an 8-month fœtus was found.

Eckert's patient died 15½ hours after an acute onset. A 3-month fœtus was found at autopsy.

Bar and Bufnoir's patient died five days after an acute onset. At autopsy a fœtus weighing 1025 grams was found. It had evidently been alive until the time of rupture.

The cause of death (post-operative) in nine cases was stated as follows:

Bonnaire and Brac's patient was about six weeks pregnant. The cervix was dilated, the uterine cavity curetted and an intrauterine injection of iodine given, followed by death 45 minutes later. At autopsy no cause for death found.

Funke's (Kühlmann) patient ruptured at the third month; the first acute symptoms had appeared 35 hours before operation. She was in shock when operated upon, and died one and one-quarter hours later. Supravaginal hysterectomy was performed.

Glaesmer's patient had ruptured probably six and one-half hours before operation. She was in shock when operated upon, and died three hours later. A 7-month dead fœtus was removed at operation by panhysterectomy with bilateral salpingo-oöphorectomy.

Koblanck's (Opitz) patient was in shock when operated upon, and died a few hours later. A 1 to 2-month pregnancy was removed by a wedge excision of the cornu with suture.

Kynock's patient was in poor condition when operated upon, although the sac had not ruptured. A 4-month pregnancy was removed by supravaginal hysterectomy. The patient died three days later from hæmorrhage from the cervical stump.

Olhausen's (Opitz) patient was in shock when operated upon, and died a few hours later. A 1 to 2-month pregnancy was removed by a wedge excision of the cornu with suture.

Raschkes' patient had ruptured when three and one-half months pregnant. A resection of the uterine cornu was done, and the patient died eight days later with symptoms of a general peritonitis.

Siefart's patient had ruptured seven hours before operation. A 2-month pregnancy was removed by resection of the uterine cornu, and death occurred 12 hours later from shock.

Weinbrenner's patient (Case II) underwent a resection of the uterine cornu for a 4-month infected pregnancy; the fœtus was macerated. Death occurred three days later from general peritonitis.

REPORT OF CASES FROM THE LITERATURE

Since the publication of Farrar's paper, there have been 17 cases published, of which only three have been reported in full, with pathological and histological descriptions. A thorough microscopic study is necessary in many cases to prove the diagnosis beyond criticism, although only a small number have been studied carefully in this way. Eckert states that up to 1904 only three cases had been submitted to microscopic studies, Ulessko-Stroganowa's, Leopold's and Raschkes'.

The undoubted cases are Mangiagalli's (fully reported by Colombino in 1914) and Popoff's two cases (in 1914).

Probable cases have been reported by

Czyzewicz, 2 cases, 1914. (No illustrations; no pathological report.)

Gibson, 1 case, 1914. (No illustrations; incomplete pathological report.)

Heyman, 1 case, 1915.

Kastaneff, 4 cases, 1914. (No illustrations; no microscopic report.)

Kohlman, 1 case, 1916. (No pathological report.)

Leonormant & Hartmann, 1914, 2 cases in a series of 37 tubal pregnancies (descriptions incomplete).

Oastler, 2 cases, 1915. (No illustrations; no pathological report.)

Viannay, 1 case, 1913. (No illustrations; no microscopic report.)

Vineberg, 2 cases, 1915. (No illustrations; no pathological report.) One case was operated on by himself and one case he saw at autopsy.

REPORT OF CASE

GYN. No. 20777.—The patient was a white woman, 24 years old, married five years, who had had a normal labor and puerperium three years before and had had no miscarriages. Six years before admission she had had an attack of abdominal pain diagnosed as appendicitis, but had not been operated upon for it. The past history was otherwise negative.

Her last regular period began August 1, 1914; since that time amenorrhœa had persisted. She considered herself pregnant.

At 1 p. m., November 29, 1914, she fell down stairs, and at 1.30 p. m., while attending to her household duties, she was seized with violent general abdominal pain and lay down on the floor, where she remained until carried to bed. The pain continued very severe all the afternoon and at 5 p. m. she vomited. She noticed that her abdomen was becoming larger and was very tender. A physician was called to see her and brought her to the hospital with a diagnosis of an acute ruptured appendix. At 11.55 p. m., November 29, 1914, she was admitted to the hospital.

Physical Examination.—The patient is a well-nourished and well-developed woman in much pain. The skin and mucous membranes are extremely pale; the skin is cold and covered with sweat; the pulse is 160, small and weak; the temperature (rectal) 99°F. The abdomen is distended, tense, very tender, and movable dullness is demonstrable.

Diagnosis.—Ruptured extra-uterine pregnancy.

The patient was taken to the operating-room at once and prepared for operation. Under ether anæsthesia the pelvic examination revealed a uterus twice the normal size. A small nodule was felt in the right uterine cornu and a soft mass in the right fornix (suggesting clot). W. B. C. 20,000. Hb. 70 per cent (Sahli).

Operation.—At 1.30 a. m., November 30, 1914, by Dr. J. C. Neel, Resident Gynecologist.

When the abdomen was opened through a midline incision below the umbilicus a large amount of fluid blood and fresh clots escaped (estimated at two liters). A nodule measuring 2.5 cm. in diameter was seen in the right uterine cornu, on the posterior surface of which there was a perforation 1 cm. in diameter, through which placental tissue bulged. There was no active bleeding. The attachment of the round ligament was anterior to the gestation sac. A few fine adhesions were found about the right adnexa; the left tube and ovary were normal.

The uterine cornu and a small portion of the right tube were rapidly resected, the uterine cavity was opened and cleaned out with the finger. The wound was then sutured with catgut and the raw area covered by suturing over it a fold of the round ligament. Fluid blood and clots were quickly cleaned out of the abdominal cavity and the abdomen was closed in layers.

A subcutaneous infusion of normal salt solution was started during the operation and continued in the ward, 1500 cc. in all being given.

The patient made a rapid recovery and was discharged from the hospital in good condition, December 13, 1914.

The hæmoglobin curve in this case is interesting.

On admission	11/30/14, 1 a. m.	HB = 70% (Sahli)	W. B. C. 20,000.
	11/30/14, 3 p. m.	" = 50% (Sahli)	W. B. C. 12,000.
	12/1/14	" = 34% (Sahli)	
	12/2/14	" = 30% (Sahli)	
	12/3/14	" = 40% (Sahli)	
	12/6/14	" = 45% (Sahli)	
	12/10/14	" = 55% (Sahli)	
	12/13/14	" = 59% (Sahli)	

Somewhat similar hæmaglobin curves have been found in a series of cases of acute hæmorrhage followed by Dr. Dunn and myself during the past two years.

Specimen from Gyn. No. 20777. Anatomical No. 1188.—The specimen consists of the right uterine cornu and 1.5 cm. of the tube. It measures $3.5 \times 2.5 \times 2.5$ cm. The posterior superior wall bulges out, and in the most prominent area there is a perforation measuring 1 cm. in diameter, through which a mass of chorionic villi protrudes. At the proximal end of the specimen there is a small area of endometrium, measuring 8 mm. in thickness. The portion of tube accompanying the specimen measures 5 mm. in diameter.

A longitudinal section of the specimen shows a gestation sac measuring 2 cm. in diameter, which is filled with blood-clot, and chorionic villi, surrounded by uterine muscle which, between the gestation sac and endometrium, measures 2 cm.

Microscopic Study.—There is a marked decidual reaction of the endometrium, areas of markedly hypertrophied uterine glands (spongy layer) and other areas of slightly hypertrophied glands. There is some infiltration with polymorphonuclear and mononuclear leucocytes. The vessels are gorged with blood.

The cells of the myometrium are hypertrophied. The gestation sac is surrounded by uterine muscle which, over the posterior wall, is thinned out to 2 mm. in thickness (the perforation was above this section). The muscular wall lies between the gestation sac and the proximal section of the isthmus of the tube.

The peritoneal surface is covered with a single layer of cells, varying from the cuboidal to flat types, with light-staining cytoplasm and uniformly dark-staining nuclei lying about the center of the cells.

Two vessels in the muscular layer show marked hypertrophy of the endothelium. Syncytial cells have invaded the muscle and opened up blood spaces. A thin layer of decidual cells can be seen in some areas, but there is no continuous decidual layer. No tubal mucosa can be found. Masses of chorionic villi in blood-clot are present; some villi are œdematous and are covered by the syncytial layer only, while others have well preserved Langhans and syncytial layers. No amnion was found. The fœtus was not found.

A cross section of the tube between the uterine cavity and the gestation sac shows strands of two layers of epithelial cells in apposition for the most part, but in one or two areas these two layers are separated by small spaces showing that the lumen has been compressed. The cilia can be seen on these cells. The tissue between these strands of epithelium is composed of a very vascular connective tissue infiltrated with small round cells. At one edge of the tube there is a small, irregularly shaped lumen. At the edge of the circular muscle layer there are several spaces apparently due to splitting of the muscle.

The isthmus of the tube shows no evidence of inflammatory reaction. The folds of the mucosa are normal; cilia are present, there is no hypertrophy of the muscle and no decidual reaction can be found.

It seems probable that in this case the ovum was arrested in the interstitial portion of the tube, owing to this inflammatory condition just described.

Gyn. No. 15342.—The patient was a negress 35 years old, married 18 years, who had one full-term child 11 years before and had had no miscarriages. The labor and puerperium were normal. There was no history suggesting pelvic inflammatory disease. Menstruation had been normal. The last period had begun, November 16, 1908, and had continued the usual four days. No periods had been missed and there was no history of intermenstrual bleeding.

Present Illness.—At 7 p. m., November 23, 1908, she was seized with a severe cutting pain in the R. L. Q. of the abdomen, which lasted until 4 a. m., November 24, 1908. A similar attack had occurred on December 1, 1908, accompanied by nausea and vomiting, and again, on December 3, 1908, she had had an attack localized in the umbilical region, accompanied by nausea and vomiting, and the patient fainted while walking to her bed. For the five days before admission she had had burning with frequency and difficulty on voiding. For two weeks there had been a foul, irritating vaginal discharge, not bloody. She had felt giddy frequently and had been confined to bed most of the time after onset.

Physical Examination.—On admission, December 6, 1908. Temperature 99°. Pulse 96, good quality. The mucous membranes are pale. The breasts contain colostrum. There is a small umbilical hernia and a right inguinal hernia; otherwise the abdomen is normal.

Pelvic Examination.—There is no evidence of infection of Bartholin's glands or of the urethra. The cervix is enlarged but otherwise normal. The fundus is in anteposition and movable. The adnexa are adherent, thickened and tender. There is a small nodule in the right uterine cornu.

December 9, 1908. Examination under ether anæsthesia discloses no abdominal masses. A slight chocolate-colored discharge is present. The cervix is enlarged but firm. The fundus is about normal in size; it is adherent in mid-position and there is a soft mass in the right uterine cornu. The ovaries are adherent.

Diagnosis.—Chronic pelvic inflammatory disease. (Extrauterine pregnancy was not suspected.)

December 9, 1908. *Operation* by Dr. Casler, Resident Gynecologist.

When the abdomen was opened through a midline incision below the umbilicus, a large quantity of old, dark, clotted blood was seen. At the right uterine cornu there was a soft cystic tumor, the size of a small lemon. The right tube was practically normal except for a slight oozing from the fimbriated extremity. The left adnexa were adherent. The insertion of the round ligament was anterior and lateral to the tumor. The right tube and uterine cornu were resected, the wound was sutured with catgut and the raw area covered by suturing a fold of the round ligament over it. A cigarette drain was placed through the posterior vaginal vault. During the operation the specimen was ruptured and a very small deformed fœtus escaped.

The abdomen was irrigated with normal salt solution and closed in layers. The patient made a satisfactory recovery and was discharged, December 23, 1908.

Gyn. Path. No. 14277.—The specimen consists of a Fallopian tube and cornu of the uterus. The tube measures 6 cm. in length, with an average diameter of 9 mm.; it is somewhat nodular, the fimbriated extremity is open. There are no adhesions over the surface. The cornu measures $4 \times 3 \times 3$ cm.; there is an opening on the upper surface 1×1.5 cm., with a cavity 2×1.5 cm. which is lined with a smooth greyish tissue. The wall of this cavity is 8 mm. thick and is evidently a cavity in which pregnancy has existed. The opening between the tube and cornu is patent. (The specimen has been preserved in 50 per cent alcohol. The photograph was made in 1915 and shows where the original blocks for microscopic study were cut. A number of other blocks have been cut since.)

Microscopic Study of Specimen (Path. No. 14277).—The inner lining of the cavity consists of the amnion, which is well preserved. Immediately below the amnion lies the chorion; in most instances the villi show more or less degeneration, but in some Langhans and the syncytial layers stain clearly. Between the villi there are fibrin and collections of leucocytes (largely polymorphonuclear cells). Syncytial cells can be seen invading the muscular wall and there are several areas of decidual cells, although there is no uniform layer of decidua.

In the region of the gestation sac there is no evidence of any tubal mucosa or of any uterine glands.

The gestation sac is completely surrounded by muscular wall, except over the posterior superior surface, where there is an opening in the sac. About 1 cm. lateral to this opening, a section shows the uterine wall completely destroyed and villi extending through

FIG. 1.—Anat. No. 1188. Gyn. No. 20777. This photograph of the gross specimen shows very beautifully the chorionic villi protruding through the perforation in the posterior superior surface. The portion of tube and the area of endometrium removed are also clearly shown. (Photographed by Dr. Daniel Davis.)

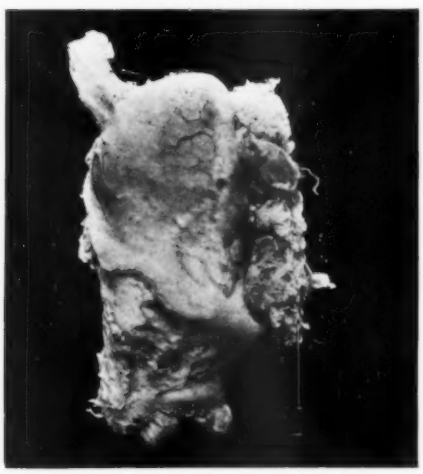

FIG. 2.—Anat. No. 1188. Gyn. No. 20777. Posterior view of the specimen showing projecting placental tissue, tube and endometrium. (Photograph loaned by Dep. of Anatomy.)

FIG. 3.—Anat. No. 1188. Gyn. No. 20777. ($\times$ 2.) Longitudinal section through the specimen showing the gestation sac, uterine wall, endometrium and two cross-sections of the tube. (Photograph loaned by Dep. of Anatomy.)

FIG. 8.—Gyn. Path. No. 14277. Superior surface of the gross specimen. The opening into the gestation sac is clearly shown. The original blocks taken from the uterine cornu and tube can be seen. (Photographed by Dr. Daniel Davis.)

FIG. 4.—Gyn. Path. No. 14277. (× 15.) Portion of the uterine cornu (cross-section) distal to the gestation sac, showing the interstitial portion of the tube and its relation to the three cavities described above. These cavities are much larger than the lumen of the tube. (Photograph by Hoffmann.)

FIG. 5.—Anat. No. 1188. Gyn. No. 20777. (× 35.) Section of tube proximal to the gestation sac. The strands of epithelium of the mucosa have been compressed by inflammatory changes until the lumen is almost obliterated. (Microphotograph by Hoffmann.)

FIG. 6.—Anat. No. 1188. Gyn. No. 20777. (×115.) Syncitial invasion of tube wall and decidual reaction of tube. (Microphotograph by Hoffmann.)

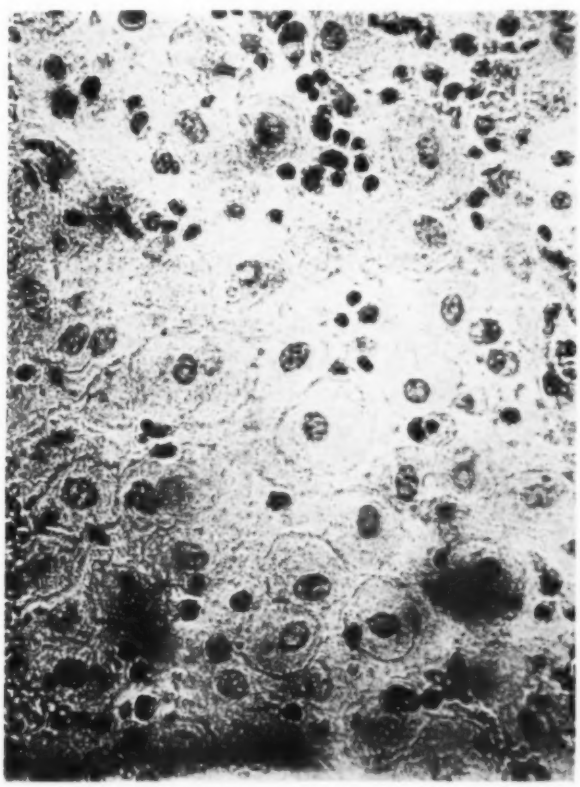

FIG. 7.—Anat. No. 1188. Gyn. No. 20777. (× 300.) Decidual reaction of endometrium with leucocytic infiltration. (Microphotograph by Hoffmann.)

the gap, which measures 2 mm. in width. In the muscular layer of the posterior wall there are two cavities, lined with a single layer of epithelium, varying from a low cuboidal to the rather high columnar type; the cells are large, having a dimly staining or clear cytoplasm and large, oval nuclei containing from one to four deep staining nucleoli; no cilia can be seen on these cells. There is no special arrangement of muscle around these spaces. The tube proximal to the gestation sac cannot be found. There is no endometrium.

A section through the uterine cornu distal from the gestation sac shows the interstitial portion of the tube and three other cavities, one of which is similar to those described in the posterior wall; the other two are larger and are lined with a single layer of poorly staining epithelium, varying from almost flat to the low columnar type. These cavities are filled with blood pigment and debris of cells. The interstitial portion of the tube shows some hypertrophy of the epithelium. There is no definite evidence of inflammatory reaction.

In the isthmus of the tube, vessels are gorged with polymorphonuclear leucocytes and there is some polymorphonuclear infiltration outside the longitudinal muscle layer. The folds of the tube are not thickened and are not adherent; the cilia of the epithelial cells can be seen; the lumen is clear.

In the ampulla of the tube there is a small amount of free blood. Many vessels are filled with polymorphonuclear leucocytes, but there is no leucocytic infiltration of the tube walls and no other evidence of inflammatory reaction.

No decidual reaction outside the region of the gestation sac can be found.

I wish to thank Dr. Howard A. Kelly for permission to publish these cases and for the interest he has taken in the paper. Dr. George L. Streetor, Dr. T. S. Cullen, Dr. Daniel Davis and Dr. W. R. Holmes have kindly assisted me in many ways. The numerous and excellent sections for microscopic study were prepared by Mr. Miller and Mr. Robinson.

LITERATURE

Andrews: Proc. Royal Society Med., Section Obs. & Gyn., 1912, VI, 52.

Baculescu: Rev. de chir., 1912, No. VI, p. 946.

Breschet: Mémoire sur une nouvelle espèce de grossesse extrauterine. Rappert général d'anat. et de physiol., Paris, 1826.

Colombino: Ann. di Ostet., Milano, 1914, p. 374.

Czyzewicz: Przegl. chir. i ginek., Warszawa, 1914, X, 268.

Dionis: Traité général des accouchements, Paris, 1718, pp. 79-80. A General Treatise of Midwifery (translation), London, 1719, pp. 81-82.

Eckert: Inaug-Diss., München, 1911.

Farrar: The Post-Graduate, 1914, XXIX, p. 168.

Fergusson: Jour. S. Carolina Med. Ass., 1913, IX, 271.

Finsterer: Ztschr. f. Heilkunde, 1908, (Supplement), XXVIII.

Fitz: Amer. Jour. Med. Sci., 1875, Vol. LXIX, p. 95.

Frankl: Kurzegefasstes Handbuch der Gesammten Frauenheilkunde, Liepmann, Band II, S. 172.

Gibson: Tr. Royal Academy Med. Ireland, Dublin, 1914, XXXII, 292.

Glaesmer: Arch. f. Gynäk., XCIII, p. 125.

Heyman: Hygiea, Stockholm, 1915, LXXVII, 529.

Johnson: Boston Med. and Surg. Jour., CLXI, p. 822.

Kastaneff: J. Akush. i jensk boliez, St. Petersb., 1914, XXIX, 181.

Kelly: Operative Gynecology, Vol. II, pp. 508, 510 and 534.

Kohlmann, New Orleans Medical and Surgical Journal. 1912-1913, LXV, 588.

Kohlmann: New Orleans Medical and Surgical Journal. 1916-1917, LXIX, 210.

Kühlmann: Inaug.-Dissert., Strassburg, 1900.

Lenormant & Hartmann: Rev. gynéc. et chir. abdominale, 1914-1915, XXIII, No. 4, p. 273.

Lequeux: Obstétrique, Mai, 1911, t. IV, p. 493.

Lewers: Lancet, London, 1911, p. 9.

Mangiagalli: Atti. d Soc. lomb. di sc. med. e biol., Milano, 1912-1913, II, 293-296.

Markoe: Bulletin of Lying-in Hospital, New York, 1911-1912, VIII, 16.

Martin: Ztschr. f. Geburt. u. Gynäk., 1885, II, 416.

Mauriceau: Traité des Maladies des Femmes Grosses, 6th Edition, 1721, pp. 86-91.

Mayer: Beschreibung einer Graviditas interstitialis uteri, nebst Beobachtungen über die merkwürdigen Veränderungen welche die weiblichen Genitalien und namentlich der uterus in hohen Alter erleiden, Bonn, 1825.

Maygrier: Zntralbl. f. Gynäk., 1908, XXXII, 84.

Nacke: Zntralbl. f. Gynäk., 1911, XXXV, Nr. 38, p. 1345.

Oastler: American Journal of Obstetrics, 1915, LXXII, 1044.

Opitz: Ztschr. f. Geburt. u. Gynäk., 1899. XL, 522.

Pegaitaz, Thèse de Genève.

Polak: Amer. Jour. of Obstetrics, 1910, LXII, 484.

Popoff: J. Akush. i. jensk. boliez, St. Petersb., 1914, XXIX, 533-544.

Robins: N. Y. Med. Journal, 1912, LXXXXV, 337.

Schenk: Inaug. Dissert., Jena, 1913, F. Gobert, 42 p. 8°.

Schmitt: Beobachtungen Kaiserl. Koenigl, Med.-Chir. Akad., Wien, 1801. Band I, Theil 5.

Schumann: Amer. Jour. of Obstetrics, 1912, LXV, 591.

Scott: Amer. Jour. of Obstetrics, 1911, LXIV, p. 821.

Siefart: Zntralbl. f. Gynäk, 1913, XXXVII, 375.

Simon: Inaug. Dissert., Berlin, 1885.

Steffen: Zntralbl. f. Gynäk, 1908, XXXII, p. 892.

Sturmdorf: Amer. Jour. of Obstetrics, 1910, 313.

Viannay: Loire méd., St. Étienne, 1913, XXXII, 410.

Vineberg: Amer. Jour. of Obstetrics, 1915, LXXI, 810.

Ward: *Ibid.*, 1913, LXVII, 1007.

Weinbrenner: Ztschr. f. Geburtsh. u. Gynäk, 1904, LI, 58.

Werth: Handbuch der Geburtshülfe, Von Winckel. Zweiter Band., Theil II, 1904, S. 739 and S. 940.

Wimmer: Zntralbl. f. Gynäk., 1903, XXVII, 52.

TRANSPLANTATION OF THE TRACHEA

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With the purpose in view of the possible utilization of a tracheal transplant in human cases in which a portion of the trachea has been resected on account of malignant disease, as suggested by Dr. William S. Halsted, I undertook to study the transplantation of the trachea in dogs. And furthermore, as a preliminary step in this problem, it seemed clear that an important factor in the success of the tracheal transplants would be the determination of the sterility of the trachea at different levels.

A review of the literature showed the rather extensive work that has been done on the healing of tracheal wounds after resection and the use of various grafts for closing tracheal

defects. The work began in 1831, when Dupuytren first studied the plastic closure of the tracheal wall. In 1845 Deffenbauch attempted to cover tracheal defects with a flap of tissue; Schüller in 1880 described the healing process of the tracheal wounds; and it has been well known that the trachea could be completely divided and the ends successfully resutured in animals and human cases, following a report of the work of Gluck and Zeller in 1881, and the later reports of Küster, von Colley, Föderl, von Eiselberg, Jones, Keene, Mesnard, von Hacker, Frankenberger, Frank, Gluck, Koenig, Kander, von Navratil, Nowakowski, Turner, Alagna and Sarguon. Complete annular segments of the trachea, varying in length from 2 to 5 cm., were excised and the remaining tracheal stumps successfully sutured by Küster in 1885, Nowakowski in 1909, and Alagna in 1913. By far the greater portion of study has been applied to the treatment of tracheal fistulæ, by using various materials for transplantation. In 1893 Photiades and Lardy used a skin-periosteal cartilaginous flap from the clavicle; while Schimmelbusch in 1893, Koenig in 1897, Aue in 1900, and Kusnetzow in 1909, reported using such a flap from the sternum; a skin and thyroid cartilage flap was used by Koenig in 1896 and by Wiessinger in 1906; a rib cartilage flap by von Mongold in 1899, and by Mehues in 1903; a periosteal-cartilage flap from the tibia by von Navratil; a silver wire net by Grosse in 1901; free fascia transplants by Kirschner in 1910; and fascia lata by John Staige Davis in 1911. Later reports of studies with the use of fascia have been made by Koenig, Hohmeier, Kostenko, Rubaschkew, Levit, Lucas, Kirschner, Münnich, Jacquin and Malan. Various methods of using skin flaps from the neck have been described by Trnka and von Masek. In 1893 Photiades and Lardy used a rubber tube surrounded by a skin flap to take the place of a tracheal defect following a resection of the trachea for cancer. Lazarraga, Firmin-Gaston Rouzoul, Baracz and Bruwer have gone over part of the literature upon plastic surgery of the trachea. But searching through the literature revealed no other aid in the present problem until it had been completed, when the reports of three different authors were found which have been completely abstracted in the following paragraph: Mesnard in 1901 reported before the Anatomical Society of Paris that four days previously he had begun the study of transplantation of complete segments of the trachea in two dogs, and that he would show the results at the next meeting of the society; but there was no subsequent statement of the outcome of this attempt that could be found. The second experimenter was Caldera, who, in 1913, reported three groups of experiments on rabbits. He successfully resutured with catgut the divided trachea, and at post-mortem examination found a well-healed wound that formed a clearly marked annular scar which was infiltrated with calcareous salts. In the second group of experiments Caldera made tracheal transplants of complete segments, 1.5 cm. in length, with the result that one rabbit had post-operative symptoms of stenosis for 16 days, and post-mortem examination after 20 days showed a heavy annular deposit of calcium salts, while another rabbit showed a calcareous infiltration of the cicatrix without stenosis. In the third group of experiments he made tracheal transplants of segments of similar size after preserving them for 24 and 48 hours in sterile Ringer's solution at 37° and 20° C., respectively. He reported at the end of 20 days a satisfactory clinical and anatomical result and a moderate calcereous infiltration of the cicatrix without stenosis. In conclusion he stated, without having made any cultural examinations that one could find, that the bacteria which were habitually present in the trachea had become attenuated in virulence, so that therefore they did not constitute a danger at the time of the operation. Furthermore, he added that the anastomotic union of the trachea took place by connective tissue, which was infiltrated with lime salts. He mentioned no bibliography and only briefly described his specimens, which were not reproduced in the article. Finally, Zuccardi-Merli in 1914 reported an experiment upon dogs in which he planned to repeat the work that Caldera did upon rabbits. Using the same technique he tried fresh tracheal transplants consisting of four cartilagenous rings, with the result that a left lateral stricture was formed that did not produce symptoms during life. In the case of the transplants preserved for 48 hours in Ringer's solution and placed in a different-sized animal, he claimed to have obtained after 20 days a satisfactory union without stenosis. He then repeated the fresh tracheal transplants of the same diameter of the trachea and employed more accurate technique, with the result that all were failures. He stated that the stenosis, which some observers have obtained after simple resection and suture, might be due to the contraction of an organized blood clot about the trachea, as a result of the imperfect approximation of the bleeding edges. He did not fully describe the specimens, which were not reproduced in the article.

On account of the splendid results obtained in several of the cases of auto-tracheal transplants in dogs, it was deemed advisable to report the following experiments which seemed to divide themselves into two classes; the main division consisted in the auto- and iso-transplantation of complete annular segments of the trachea in dogs; and a subordinate division, which was undertaken as a preliminary step to the main problem, consisted in the determination of the sterility at different levels of the trachea of the cat.

The experiment to determine the sterility of the trachea was as follows: Under ether anæthesia and after sterilizing the operative field thoroughly with alcohol, the trachea was exposed from the larynx to its bifurcation. Blood for cultures was taken from the carotid artery. Four sets of sterile instruments were used in obtaining the different specimens, as follows: One to expose the trachea and to remove wound muscle as control culture of the operative technique; and other sets to remove the trachea at three different levels; that is, at the bifurcation, midway up, and just below the larynx, respectively. These tracheal rings and pieces of muscle were placed in broth, in Ringer's solution, in blood, and in 1/100000 aqueous bichloride solution. Some of the cultures were kept on ice and others at 37° C. Approximately 60 cultures were thus made. All of the control cultures and all the cultures that were kept on ice and later placed in the thermostat remained free from bacterial

growth, as did also the cultures that were kept at 37° C., except for a cloudy growth after 48 hours in one of the broth cultures from the trachea near the hilus of the lung, which contained a small piece of a lymph gland that probably accounted for the growth. The stained smear of this culture showed a Gram-positive coccus that was not in chains. The remaining cultures of the trachea near the hilus of the lung showed no growth.

With a knowledge of the preliminary facts as just stated concerning the sterility of the trachea, the following experiment in the auto-transplantation of the trachea in dogs was made. The animals were kept under ether anæsthesia by mouth or through a tracheotomy wound. A midline incision was made from the larynx to the suprasternal notch and the muscles separated down to the pretracheal fascia. This fascia contained numerous blood vessels, which in part supplied the circulation to the intercartilaginous portions of the trachea. These vessels were ligated and divided only over that portion of the trachea which was to be transplanted. A second important blood supply of the trachea was furnished by a vessel upon either side of the trachea and parallel with it; this was ligated just at the point where the trachea was to be divided, in order to preserve the circulation of the trachea to the very line of incision. After careful attention to the blood supply, a segment of the trachea, composed of from three to nine cartilaginous rings in length, was completely separated by transverse incision and removed, thus assuring complete absence of blood supply to the transplant. This auto-transplant was then replaced and sutured end-to-end by using three equidistantly placed interrupted black silk sutures, which picked up the perichondrium and cartilage without penetrating the entire tracheal wall. The silk was threaded on fine, curved French needles which were fastened in a needle-holder, and very small delicate forceps were used to steady the tissues in order to avoid trauma. One short continuous black silk suture was placed in the fibro-elastic posterior wall of the trachea. Both ends of the transplant were sutured in the same way. The incised end of the transplant was just approximated to the cut surface of the trachea, without tension or overlapping. No disfigurement to the normal contour of the trachea was caused by the transplant, and no air escaped through the line of anastomosis when it was completed. One long heavy black silk tension suture (refer to photograph) was placed in the anterior surface of the trachea from above to below the transplant in order to relieve tension upon it during the process of healing. The perichondrium of the tracheal rings proved to be the strong layer of closure. The pretracheal fascia was approximated with a continuous silk suture; the muscles were brought together in the midline; and the skin was tightly closed with a continuous subcuticular fine black silk suture. A collodion gauze dressing was applied.

The operative technique in the cases of the iso-tracheal transplants was similar to that just stated for the autotransplants. Both animals were operated upon at the same time and the tracheal transplants were interchanged. Intratracheal anæsthesia was administered through a separate tracheotomy wound which was located below the region of the transplant. It was an interesting fact that the tracheal segments from the different-sized animals were readily adapted in size to one another because of the anatomical fact that the cartilaginous portion of the tracheal rings was not complete and the posterior wall was formed of fibro-elastic tissue.

All animals recovered promptly from anæsthesia and operation. The skin wounds healed *per primam*. After operation some of the animals (C_7, C_1, C_6, D_1, D_2) had an hoarse voice, a dry cough, and a rather stiff neck, which, when walking, they would occasionally shake from side to side, especially in the case of the dogs with the long transplants. Although otherwise their general condition remained very well, yet after from one to three weeks they developed marked symptoms of tracheal obstruction with dyspnœa, and died. Autopsy revealed a normal esophagus and lungs, and a stricture of the trachea at the site of the transplant. Only one animal (C_4) developed a purulent infection at the site of the transplant, together with a complicating bronchitis and pneumonia which caused death in four days after the operation. In these unsuccessful cases, the dogs with the short tracheal transplants lived from one to two weeks, while the animals with the long transplants lived approximately three weeks. The cases of iso-tracheal transplants resulted in death with symptoms similar to the unsuccessful cases of auto-transplants, and autopsy showed normal lungs with stricture of the trachea at the region of the transplant.

The microscopical studies of sections made through the anterior and posterior walls of the strictures showed it to consist of a mass of granulation tissue, in the deeper layers of which there were pieces of poorly staining cartilage that were in the process of destruction. Many long and short chains of a rather large, thick bacillus and numerous scattered cocci were present. The mucous lining was usually absent and the normal relationship of the tracheal layers was destroyed.

The successful transplant cases (C_2, C_5, C_8) showed no symptoms and gave every evidence that they were as healthy and normal as before operation. At the time when these dogs (C_2, C_5, C_8) were sacrificed in order to observe the experimental results, hair had grown out and covered the neck of the animal, completely hiding the white line of the operative incision. The neck showed nothing unusual in appearance, and upon palpation the structures of the neck felt normal and were freely movable. Upon exposing the trachea it was found normally mobile, without adhesions, and one could make out by gross examination no reaction in the tissues or structures about the site of the transplant. The healing was so satisfactory that the location of the anastomosing silk suture was the best guide to the transplant. There was no disfigurement to the normal contour of the trachea, as can be seen in the photographs which were taken by J. A. Martin, of the Johns Hopkins Hospital. The color, consistency, and shape of the cartilage and tissues forming the transplant seemed normal, like that in the unoperated portion of the trachea. The inside of the trachea was smooth and normal throughout its length. The life of these perfect transplants (C_3, C_5, C_8), that is, from

the date of the operation until the animals were sacrificed, was 62, 54, and 36 days, and the segment transplanted was composed of three, four, and seven cartilaginous rings, respectively.

Upon histological examination of the anterior and posterior walls of the trachea, the tissues of the transplant appeared so normal that it was difficult to locate the point of anastomosis except by the presence of the suture or by the knowledge of the location of the section in the original specimen. The layers had their normal relationship. The epithelium was everywhere present, although it was not as high at

little indenture on the left side of the transplant which proved, on opening the trachea, to be a moderate lateral stricture.

Therefore, from the above facts one might say: (1) that according to the studies with cultures, the trachea was practically in all cases sterile from the larynx to the hilus of the lung; (2) that transplant C_5—54 days, was an example of a perfect auto-tracheal transplant; (3) that in the successful cases the healing took place by the normal layers of the tracheal wall and not by fibrous cicatrix; (4) there was no infiltration with calcareous salts; (5) that the strictures resulted from an infection which was caused by the organisms that were observed

RESULTS OF TRACHEAL TRANSPLANTS—ALL ANIMALS REPORTED

No. of medium- or large-sized dog	Date of operation, 1917	No. of tracheal rings transplanted	Auto- or iso-transplant	Healing	Post-operative symptoms	End of experiment	Duration of experiment	Result
C_1	March 31.	3	Auto.	Per primam.	Slight hoarseness, slight stiffness of neck. Tendency to shake neck. After 10 days difficulty in breathing began and became gradually fatal.	Died, April 14.	14 days.	Stricture of trachea. Lungs OK.
C_2	April 17.	3	"	"	Slight dry cough for a few days.	Sacrificed, June 19.	63 days.	Slight stricture on left side of trachea. Lungs OK.
C_3	April 18.	3	"	"	(None)	Sacrificed, June 19.	62 days.	Transplant fine. Lungs OK.
C_4	April 19.	3	"	Infection at site of transplant.	Difficulty in breathing. Rapid, short respiration. Some prostration at end.	Died, April 23.	4 days.	Breaking down of transplant; bronchitis; pneumonia.
C_5	April 26.	4	"	Per primam.	(None)	Sacrificed, June 19.	54 days.	Transplant perfect. Lungs OK.
C_6	April 26.	8	"	"	Neck somewhat stiff. Shakes head and neck. Voice hoarse. Some difficulty in respiration.	Sacrificed, June 19.	24 days.	Stricture of trachea. Lungs OK.
C_7	May 8.	9	"	"	.....	Died, June 2.	25 days.	Stricture of trachea. Lungs OK.
C_8	May 11.	7	"	"	(None)	Sacrificed, June 19.	36 days.	Transplant fine. Lungs OK.
D_1	May 25.	6	Iso.	"	Difficulty in respiration. Dry cough.	Died, June 2.	8 days.	Stricture.
D_2	May 25.	6	"	"	Difficulty in respiration. Dry cough.	Died, June 1.	7 days.	Stricture.

the point where the incision had been made. The anastomosis was formed by the tissues of the different layers themselves and not by connective tissue. There was no scarring or infiltration with lime salts. There was no reaction in the tissues except for a beginning giant-cell development about the sutures which took place for the purpose of absorbing the silk. The cartilage of the transplant stained the same and, as nearly as one could tell, resembled that of the untransplanted portion of the trachea. No bacilli nor cocci could be seen anywhere in the sections.

A fourth case (C_2) had a slight dry cough for a few days after operation, which cleared up. Otherwise, dog (C_2) seemed healthy and normal and when sacrificed 63 days after operation, the trachea looked to be in good condition except for a

in the histological sections; (6) that iso-tracheal transplants resulted in stenosis.

Furthermore, one might offer an explanation or possible interpretation of several facts which became evident in the course of these experiments. In the first place, the stricture of the trachea that resulted in the unsuccessful cases was probably due to the low-grade infection that was not sufficiently virulent to cause the skin wounds to break down or to infect the lungs. The organisms might have gotten into the trachea with the air while the animals breathed through the tracheotomy wound at the site of operation. A second point that perhaps might be mentioned was that the infection which appeared in the one tube containing the piece of lymph gland, during the study of the sterility of the trachea, emphasized the point

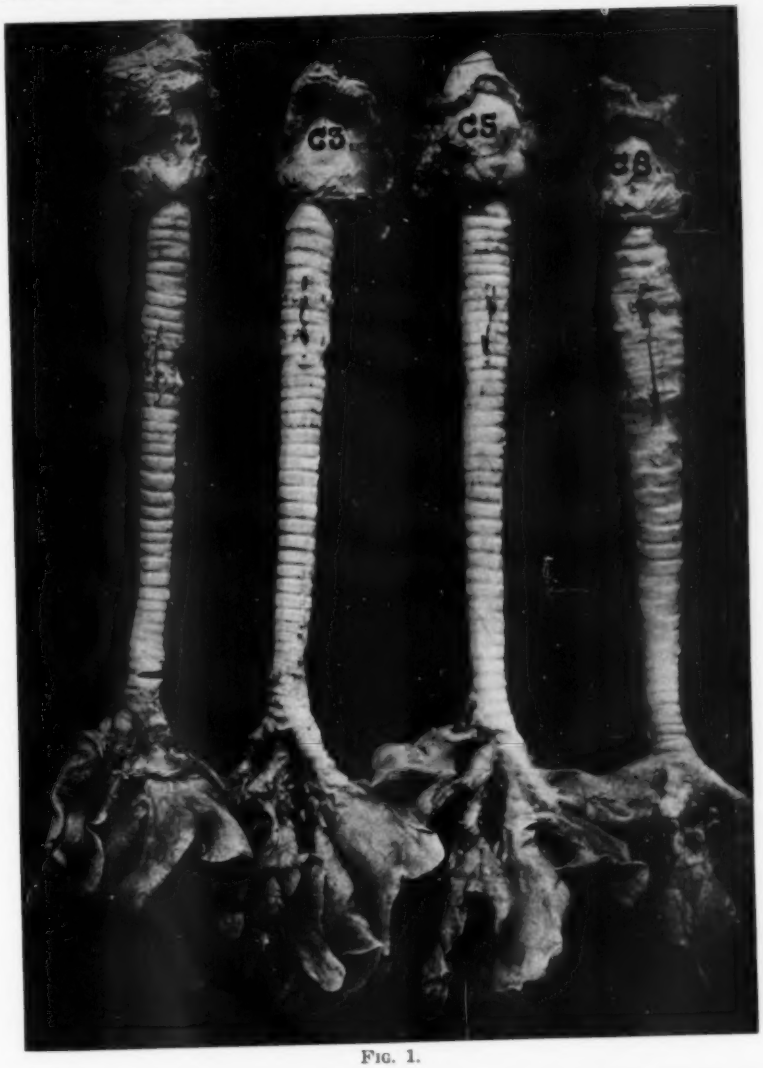

FIG. 1.

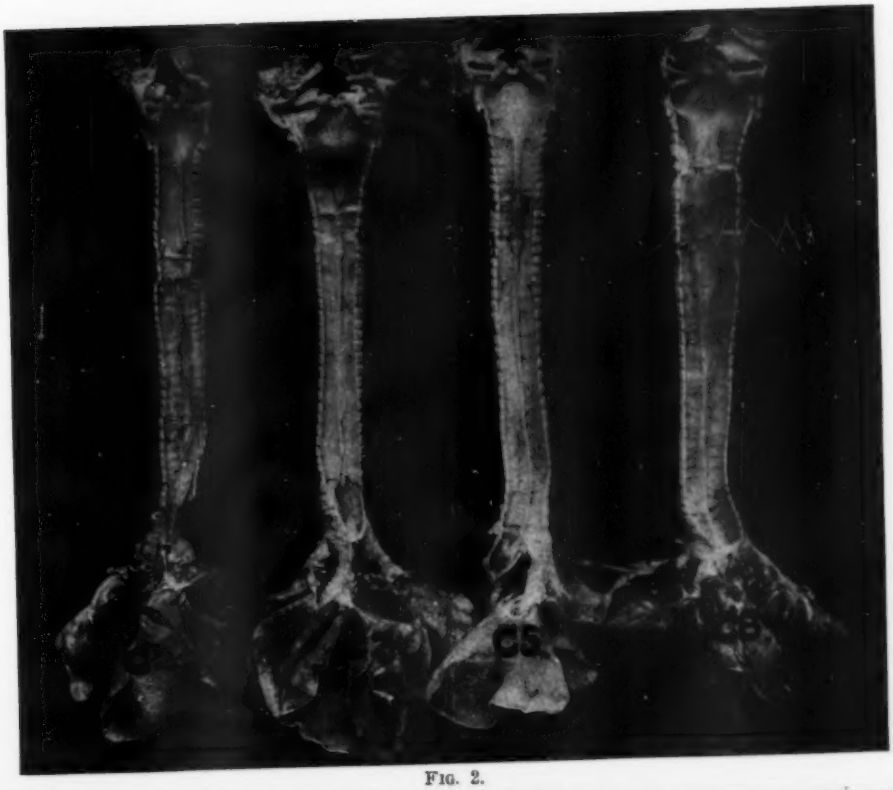

FIG. 2.

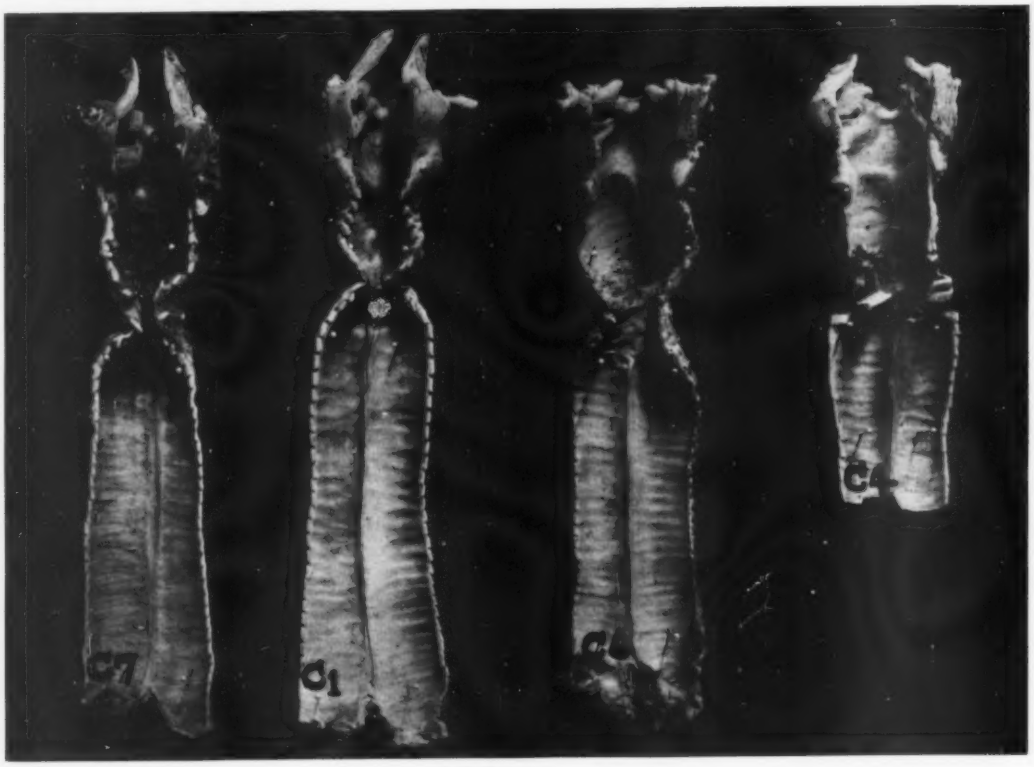

FIG. 3.

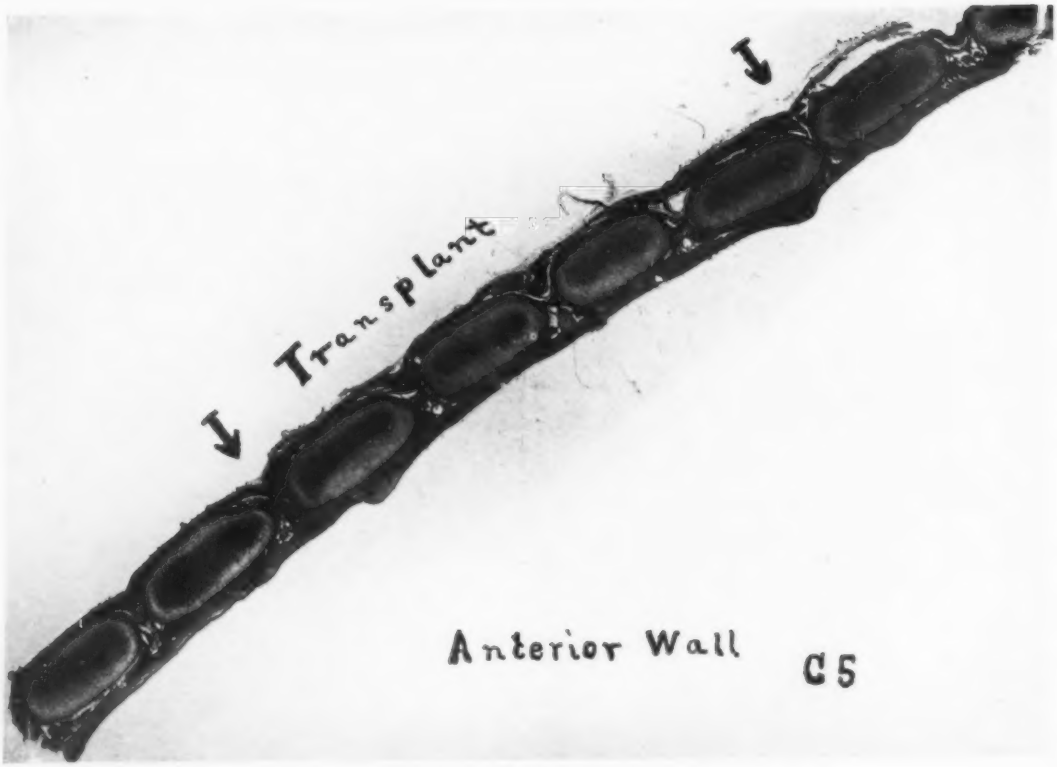

FIG. 4.

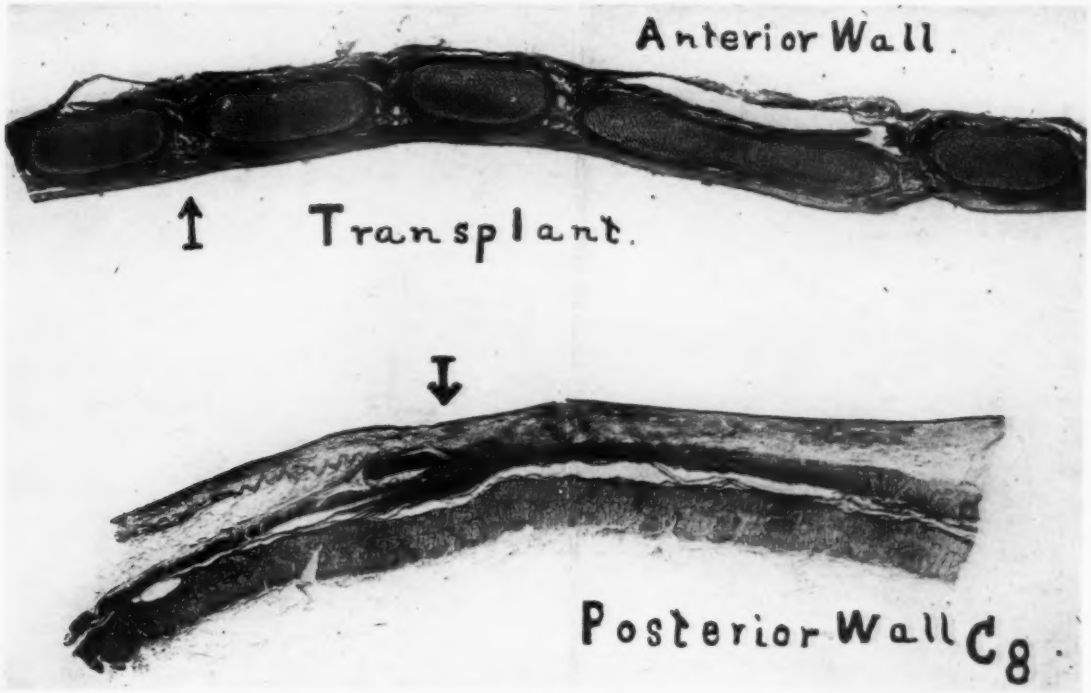

FIG. 5.

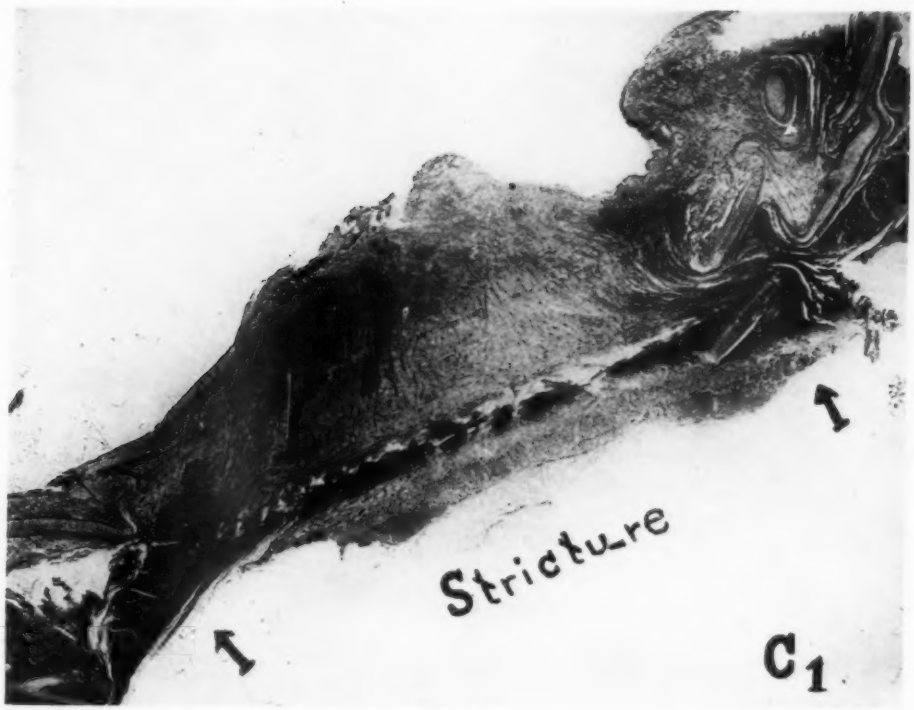

FIG. 6.

that lymphatic vessels and glands which must be cut across in a clean wound should receive careful sterilization either with the cautery or by carbolic-alcohol technique, just as any other infected material. This would be especially true in a case where the glands and vessels drained regions that were known to be badly exposed to infection. Such technique would only require a more accurate knowledge of the lymphatic structures and their drainage, and cutting these infected lymphatic vessels and glands might explain some of the unexpected infections which develop in clean wounds.

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BIBLIOGRAPHY

1880, Schüller, M.: Heilungsprocess der Trachealwunde. Deutsche Chir., 1880, XXXVII, 96-100.

1881, Gluck, T., und Zeller, A.: Die prophylaktische Resektion der Trachea. Arch. f. klin. Chir., Berl., 1881, XXVI, 427-436.

1888, Noll, F. W.: Ein Fall von Abtrennung der Luftröhre vom Kehlkopf bei fast unversehrten äusseren Weichtheilen durch Operationen u. s. w., erzielte vollständige Anheilung. Deutsche Ztschr. f. Chir., Leipz., 1888, XXVII, 597-600.

1893, Küster: Zur Deckung von Trachealdefekten. Verhandl. d. deutsch. Gesellsch. f. Chir., Berl., 1893, XXII, 80-81.

——, Schimmelbusch: Zur Deckung von Trachealdefekten. Verhandl. d. deutsch. Gesellsch. f. Chir., Berl., 1893, XXII, 78-80.

——, Photiades u. Lardy: Contributions à la chirurgie des voies respiratoires. Rev. méd. d. la Suisse, rom., Genève, 1893, XIII, 44-50. Ref.: Zentralbl. f. Chir., Leipz., 1893, XX, 895.

1894, Colley, F.: Die Resektion der Trachea; eine experimentelle Studie. Deutsche Ztschr. f. Chir., Leipz., 1894, XL, 150-162.

1896, v. Eiselberg, A.: Zur Resektion und Naht der Trachea. Deutsche med. Wchnschr., Berl. & Leipz., 1896, XXII, 343-344.

——, Koenig, F.: Zur Deckung von Defecten in der vorderen Trachealwand. Berl. klin. Wchnschr., 1896, XXXIII, 1129-1131.

——, Föderl, O.: Zur Resektion und Naht der Trachea. Wien. klin. Wchnschr., 1896, IX, 1258-1260.

1897, Koenig, F., u. König, jun.: Ersatz eines grossen Trachealdefektes. Verhandl. d. deutsch. Gesellsch. f. Chir., Berl., 1897, XXVI, 95-102.

1899, v. Mangold: Ueber die Einpflanzung von Rippenknorpel in dem Kehlkopf zur Heilung schwerer Stenosen und Defekte. Arch. f. klin. Chir., 1899, lix, 926-936. Ibid., 1900, LXI, 955-969. Verhandl. d. deutsch. Gesellschaft. f. Chir., 1900, 460.

——, Jones, N. S., and Keen, W. W.: Two unusual cases of surgery of the trachea. Phila. M. J., 1899, III, 1295-1298.

1900, Aue, G. K.: Plastische Deckung von Trachealdefekten. Arch. f. klin. Chir., Berl., 1900, LXI, 124-129.

——, Trnka: Eine praktische Methode der Tracheoplastik mit gedoppelten Hautlappen. Zentralbl. f. Chir., Leipz., 1900, XXVII, 413.

——, Mesnard, M. A.: Pièces de suture de la trachée de chien. Bull. Soc. anat. de Par., 1900, LXXV, 1037.

——, Mesnard, A.: Sutures de sections complètes de la trachée chez des chiens. Bull. Soc. anat. de Par., 1900, LXXV, 1070.

1901, v. Hacker: Resektion der Luftröhre mit primärer zirkulärer Naht wegen hochgradiger ringförmiger Narbenstriktur; Idee einer halbseitiger Laryngoplastik. Beitr. z. klin. Chir., Tübing., 1901, XXXII, 709-724.

——, Frankenberger, O.: Sur la resection de la trachée. Transl.: Ann. d. mal. de l'oreille, du larynx (etc.), Par., 1901, XXVII, 424-436.

——, Grosse: Trachealknorpel Defekt und silberdraht Netz Bedeckung. Zentralbl. f. Chir., Leipz., 1901, XXVIII, 1110-1111.

——, Baracz: Ein Beitrag zur Tracheoplastik. Transl.: Wien. klin. Wchnschr., 1901, XIV, 1054-1056.

1902, Frank: Ueber Trachealstenose und deren Behandlungsmethoden. Inaugural Dissertation, Bonn, 1902, 8°, p. 47.

——, Gluck T.: Der gegenwärtige Stand der Chirurgie des Kehlkopfes, Pharynx und der Trachea. Chirurgenkongress, 1902. Zentralbl. f. Chir., Leipz., 1902, XXIX, 64-67.

——, v. Hacker: Kontinuitäts Resektion der Trachea und circuläre Naht. Wien. klin. Wchnschr., 1902, XV, 829.

1903, Kander: Resektion und Naht bei Tracheal- und Diaphragm-Larynxstenose. Beitr. z. klin. Chir., Tübing., 1903, XXXVIII, 133-149.

——, Mehues: Ueber die Behandlung von Larynxstenosen und Trachealdefekten—Sitzung der freien Vereiningung der Chirurgie, Berlin. Zentralbl. f. Chir., Leipz., 1903, XXX, 846.

——, v. Navratil: Fall von Trachealstenose geheilt mittelst Transplantation eines Hautperiostknochenlappens. Pest, med.-chir. Presse, Budapest, 1903, XXXIX, 452-453.

1904, v. Eiselberg: Zirkuläre Resektion der Trachea wegen Karcinoma der Schilddrüse. Wien. klin. Wchnschr., 1904, XVII, 580.

——, v. Hacker: Ueber die Behandlung der Narbenstrikturen der Luftröhre und die Mangold'sche Laryngo-Trachealplastik. Beitr. z. klin. Chir., Tübing., 1904, XLIV, 762-786.

——, v. Masek: Ein Fall von Operation einer Trachealfistel. Zentralbl. f. Chir., Leipz., 1904, XXXI, 27.

1906, v. Hacker: Schleimhaut und Knorpelplastik bei Stenose der Luftröhre infolge von Sklerom. Wien. klin. Wchnschr., 1906, XIX, 1508-1512.

——, Wiessinger: Aerztlicker Verein in Hamburg. Sitzung vom 12 December, 1905. München. med. Wchnschr., 1906, LIII, 46.

1908, v. Navratil, D.: Ueber die zirkuläre Trachearesektion; eine neue Tracheanaht. Deutsche Ztschr. f. Chir., Leipz., 1908, XCIX, 450-460.

——, Firmin-Gaston Rouzoul: Camelards et tracheaplastic. Bordeaux, 1908, 39 pp., 8°.*

1909, Turner, G.: Resection of the trachea for cicatricial stenosis. Brit. M. J., Lond., 1909, I, 1355.

——, Kusnetzow, M. M.: Die operative Behandlung von Defekten und Stenose von Kehlkopf und Luftröhre. Zentralbl. f. Chir., Leipz., 1909, XXXVI, 589.

——, Nowakowski, K.: Beitrag zur Tracheoplastik. Arch. f. klin. Chir., Berl., 1909, XC, 847-861.

1910, Kirschner, M.: Die praktischen Ergebnisse der freien Fascien-Transplantation. Verhandl. d. deutsch. Gesellsch., f. Chir., Berl., 1910, XXXIX, 223-247.

1911, Davis, John Staige: The transplantation of free flaps of fascia; an experimental study. J. H. H. Bull., Balt., 1911, XXII, 372-381. Ann. Surg., Phila., 1911, LIV, 735-749.

——, Koenig: Neue Wege der plastischen Chirurgie. (Verlötung und Ueberbrachung). Verhandl. d. deutsch. Gesellsch. f. Chir., Berl., 1911, XL, 92-110. Berl. klin., 1896. Arch. f. klin. Chir., XCV, Deutsch. med. Wchnschr., 1911, 150.

——, Hohmeier, F.: Experimente über Verschluss von Wunden und Ueberbrückung von Defekten Schleimhautragender Körpercanäle und Höhlen durch freie Autoplastik. Verhandl. d. deutsch. Gesellsch. f. Chir., Berl., 1911, XL, 124-134. Arch. f. klin. Chir., 191, XL, 345-358.

——, Hohmeier, F.: Ueber ein neues Verfahren zur Deckung von Trachealdefekten. München. med. Wchnschr., 1911, LVIII, 948.

——, Lazarraga, J.: Beitrag zur Tracheoplastik. Griefswald, 1911.

1912, Kostenko u. Rubaschew: Ueber die freie Fascientransplantation. Zentralbl. f. Chir., Leipz., 1912, XXXIX, 1448-1449.

——, Levit, H.: Deckung von Trachealdefekten durch eine freie Plastik aus der Fascia lata femoris. Arch. f. klin. Chir., Berl., 1912, XCVII, 686-699.

1913, Lucas, H.: Ueber die freie Plastik der Fascia lata. Arch. f. klin. Chir., Berl., 1913, C, 1129-1136.

——, Kerschen, M.: Der gegenwärtige Stand und die nächsten Aussichten der autoplastischen freien Fascien Uebertragung. Beitr. z. klin. Chir., Tübing., 1913, LXXXVI, 5-149.

——, Gluck: Fall von totale Exstirpation der Trachea. Veröffentl. d. Hufeland. Gesellsch. in Berl., 1913, 28. (Discussion, 30).

——, Gluck: Totale Exstirpation des Trachea zur Bifurkation. Berl. klin. Wchnschr., 1913, 1, 2105.

——, Alagna, G.: Zur zirkulären Trachearesektion. Deutsche Ztschr. f. Chir., Leipz., 1913, CXXV, 613-615.

——, Brewer. G. E.: Repair of tracheal wounds and fistulæ. Keen's System of Surgery, 1913, VI, 366-368. Ibid.: 1908, III, 510.

——, Caldera, C.: Chirurgia sperimentale della trachea. Arch. ital. di otol. (etc.), Torino, 1913, XXIV, 21-24.

1914, Jacquin: Deckung eines Trachealdefekts durch einen freien Fascienlappen aus der Fascia lata. Deutsche med. Wchnschr., Berl., u. Leipz., 1914, XL, 881.

——, Münnich: Ueber die Deckung von Trachealdefekten vermittelst autoplastischer freier Fascientransplantation. Deutsche Ztschr. f. Chir., Leipz., 1914, CXXVI, 193-200.

——, Sarguon: Trachéo-cricostomie pour sténose cicatricielle du cricoïde. Lyon méd., 1914, CXXIII, 106-109.

——, Zuccardi-Merli: Contributo alla questione die trapianti tracheale. Arch. ital. di otol. (etc.), Torino, 1914, XXV, 190-192.

1915, Malan, A.: Trapianti liberi di fascia lata per riparazione di perdite di sostanza della trachea. Boll. d. mal. d. creschio. d. gola. ed. naso., Firenze, 1915, XXXIII, 177-189.

EXPERIMENTS IN THE ARTIFICIAL PRODUCTION OF AMYLOID

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Although the explanations of the arterial hypertension that accompanies nephritis are very unsatisfactory, the fact that amyloid disease of the kidney is almost always without effect upon the blood pressure and without an accompanying hypertrophy of the heart is one of great interest.

At the suggestion of Drs. Welch and Winternitz, the following experiments were undertaken with the object of producing amyloid artificially in the kidneys of animals, in order to determine whether it is really true that amyloid kidneys are unassociated with high blood pressure and to study the effects of vasoconstrictor and vasodilator influences in such animals. The experiments failed of their object, however, inasmuch as it was found impossible to produce amyloid by any of the methods employed. Nevertheless, the publication of a brief summary of the work seems justified because it shows that, even when the methods described by other writers are faithfully followed over long periods, amyloid may fail to appear, a fact which would suggest that its occasional development must be regarded as either accidental or due to some factor not definitely recognized.

Notwithstanding the prolonged efforts of many investigators in past years, there is no recognized way in which amyloid can be uniformly produced in the animal body.

Positive results have been obtained in the rabbit, dog, mouse, horse and hen by the following: In the *rabbit,* by Birch-Hirschfeld, Bouchard-Charrin, Condorelli-Mangeri, Krawkow, Maximow, Davidsohn, Lubarsch, Nowak, Sczegolew, Raubitschek, Schepilewsky and Dantschakow. In the *dog* by Czerny and Lubarsch. In the *mouse* by Davidsohn and Frank. In the *horse* by Zenoni, Pease and Pearce, Lewis, Schoukewitsch and Markus. In the *hen* by Krawkow, Maximow, Davidsohn and Nowak.

Negative results were obtained in experiments with the *cat* by Davidsohn; with the *guinea-pig* by Gianturco, Davidsohn, Lubarsch and Tarchetti; with the *dove* and *frog* by Krawkow.

In order to produce amyloid, all of the investigators used injections of various substances into the animal. The substances which produced amyloid are as follows:

Staphylococcus aureus (Condorelli, Mangeri, Krawkow, Maximow, Lubarsch, Nowak, Davidsohn, Sczegolew, Raubitschek, Dantschakow), *B. pyocyaneus* (Bouchard, Charrin, Krawkow, Nowak, Michailowitsch), *B. coli* (Nowak, Baily), *B. termo* (Condorelli, Mangeri), *Friedländer's bacillus* (Frank), *Gonococcus* (Davidsohn), *B. tuberculosis* (Bouchard, Charrin), *B. dysenteriæ* (Markus), *B. pestis* (Schoukewitsch), *Putrefactive bacteria* (Nowak), *Fresh and sterile pus,* (Birch-Hirschfeld, Nowak), *Oil of turpentine* (Czerny, Lubarsch, Nowak, Sczegolew), *Various ferments* (Schepilewsky), *Diphtheria toxin* (Zenoni, Pease, Pearce, Lewis).

The *streptococcus* (Davidsohn, Lubarsch), *pneumococcus* (Lubarsch), *tetanus toxin* (Pease, Pearce), *tuberculin* (Nowak), *croton oil* (Nowak) and *silver nitrate* (Krawkow) were also used, but gave negative results.

Not all of these substances were used for any one animal, but certain ones for certain animals, as follows:

Rabbit: Pus, B. pyocyaneus, B. tuberculosis, Staphylococcus aureus, B. coli, oil of turpentine, ferments, sterile filtrate of B. pyocyaneus. *Dog:* Oil of turpentine. *Mouse:* Staphylococcus aureus, gonococcus, Friedländer's bacillus. *Horse:* Diphtheria toxin, B. dysenteriæ, B. pestis. *Hen:* Staphylococcus aureus; B. pyocyaneus, sterile filtrate of Staphylococcus aureus and B. coli, putrefied bouillon, pus, sterile pus, oil of turpentine.

Some substances produced amyloid in certain animals and not in others. For instance, Staphylococcus aureus gave a negative result in the dog, guinea-pig, cat, dove and frog (Krawkow, Davidsohn, Lubarsch, Petrone, Tarchetti); B. pyocyaneus and cholera bacillus in the hen (Krawkow); the killed B. pyocyaneus and Friedländer's bacillus in the guinea-pig (Lubarsch); oil of turpentine in the guinea-pig (Tarchetti); putrefied bouillon and sterile pus in the rabbit (Nowak); B. coli in the hen (Nowak); and sterile filtrates from culture of Staphylococcus aureus in the rabbit (Krawkow).

Certain investigators have obtained absolutely negative results with the same animals and substances which had shown positive results in the hands of previous experimenters. For

instance, Staphylococcus aureus failed to produce amyloid in the rabbit (Petrone, Tarchetti); living B. pyocyaneus and B. coli in the rabbit (Nowak); suppuration in the rabbit (Gianturco); B. dysenteriæ in the horse (Pease, Pearce); oil of turpentine in the dog (Krawkow).

It may be seen from the foregoing that although many different substances have been injected over long periods into several different types of animal, no constant success has attended upon these experiments. In this study, animals were chosen from the list of those already used with success, which were suitable for the study of the blood pressure, and the methods of injection employed were those that had been most frequently successful. Goats, dogs and rabbits were used, Staphylococcus being injected into the rabbits and goats and oil of turpentine into the dogs. The use of Staphylococcus aureus was based on Krawkow's method, and cultures in bouillon, from three to seven days old, were injected under the skin of the back, twice a week, in increasing doses starting with 0.3 or 0.5 c. c. New strains of Staphylococcus were used whenever they could be obtained from human autopsies or elsewhere. Instead of the living cultures given subcutaneously, killed cultures of Staphylococcus aureus were injected intravenously into a number of rabbits. The 48-hour bouillon culture was killed by heating in a water-bath at 60-62° C. for 20 minutes, and injections were made twice a week in increasing doses. The method of using turpentine in the dogs was based upon that of Lubarsch. Beginning with doses of 0.5 c. c., it was injected subcutaneously into the back of the dog, the dose being increased gradually and marked suppuration maintained.

The experiments were as follows:

I. Three goats injected with living cultures of Staphylococcus aureus over periods of 225, 245 and 253 days received respectively 629, 719 and 819 c. c. of the culture. At autopsy they showed no amyloid in any of their organs.

II. Six dogs received subcutaneous injections of turpentine twice weekly in doses increasing from 0.5 to 4 c. c. over periods which varied from 16 to 272 days. The total amounts of turpentine received by the dogs which lived a long time were 44 c. c. during 165 days; 72 c. c. during 189 days and 94.5 c. c. in one dog that lived 272 days. Although suppuration was continuous and some of the dogs showed albuminuria and casts, the autopsy revealed no trace of amyloid in any of the organs in any case.

III. Thirty rabbits received subcutaneous injections of bouillon cultures of living Staphylococcus aureus twice a week in doses beginning with 0.3 c. c., but increased gradually until doses of 20-25 c. c. were being given in many cases. The rabbits lived for different lengths of time after the beginning of the experiment but some survived large doses for 90-173 days, receiving a total, in some cases, of as much as 370 c. c. of the culture. A few showed albuminuria but not one developed a trace of amyloid in the organs which were thoroughly studied at autopsy in each case.

IV. Twelve rabbits were similarly treated with intravenous injection of killed Staphylococcus aureus, one surviving 249 days and receiving 441.8 c. c. of the suspension. Others survived for periods varying from 23 to 173 days and received corresponding doses of the suspension. Two of them showed albuminuria but the organs at autopsy were, in every case, devoid of amyloid and indeed showed little departure of any kind from the normal.

In the *goats*, there were no significant changes in the kidney except that in one case there was a certain amount of epithelial necrosis probably associated with the terminal peritonitis. In the dogs after turpentine injections there were generally no special changes in the kidneys, although some showed hyaline glomeruli, epithelial degeneration and infiltration with wandering cells.

Similar changes were found in the kidneys of a majority of the *rabbits* and some presented even extensive scarring. Albuminuria and casts were found throughout the experiment in many cases. Focal necroses—abscesses in the liver and abscesses in the spleen and lung—were also found.

Changes in the *rabbits* treated with killed staphylococci were much less marked than in those treated with the living organism but were of a similar character. These changes are evidently due to the direct action of the injurious agent employed in the experiment, since the animals were normal

TABLE I—GOAT

Date	Experiment No.	Animal No.	Staphylococcus aureus	Age of culture	No. of c. c. injected	Dose (in c. c.)	Length of life after first injection	Length of life after last injection	Method of injection	Urinary changes	Amyloid
1/28/16	I	1	Living	3-7 days	719.0	0.5–32.0	245 days	1 day	Subcutaneously	Albuminuria for a few days	Neg.
2/4/16	II	2	"	3-7 "	819.5	0.5–30.0	253 "	1 "	"	Neg.	"
2/18/16	III	3	"	3-7 "	629.3	0.5–30.0	225 "	1 "	"	"	"

TABLE II—DOG

Date	Experiment No.	Animal No.	No. of c. c. of turpentine injected	Dose (in c. c.)	Length of life after first injection	Length of life after last injection	Method of injection	Urinary changes	Amyloid
1/7/16	IV	1	24.0	1.0–4.0	48 days	1 day	Subcutaneously	Neg.	Neg.
1/14/16	V	2	18.5	0.5–4.0	33 "	1 "	"	Albuminuria, casts	"
2/25/16	VI	3	2.0	0.5–1.0	16 "	4 "	"	Neg.	"
3/28/16	VII	4	72.0	0.5–4.0	189 "	2 "	"	"	"
4/27/16	VIII	5	94.5	0.5–4.0	272 "	2 "	"	Slight albuminuria	"
7/13/16	IX	6	44.0	0.5–4.0	165 "	2 "	"	Albuminuria	"

TABLE III—RABBIT

Date	Experiment No.	Animal No.	Staphylococcus aureus	Age of culture	No. of c. c. injected	Dose (in c. c.)	Length of life after first injection	Length of life after last injection	Method of injection	Urinary changes	Amyloid
1/3/16	X	1	Living	5-7 days	26.1	0.3–6.0	44 days	1 day	Subcutaneously	Albuminuria, casts	Neg.
1/19/16	XI	2	"	3-7 "	25.3	0.3–5.5	41 "	1 "	"	"	"
2/11/16	XII	3	"	3-7 "	41.8	0.3–6.5	43 "	2 "	"	"	"
3/8/16	XIII	4	"	3-7 "	1.8	0.3–1.0	10 "	2 "	"	Neg.	"
3/13/16	XIV	6	"	3-7 "	70.3	0.3–10.0	78 "	3 "	"	Albuminuria	"
4/11/16	XV	8	"	3-7 "	17.3	0.3–5.0	40 "	2 "	"	Neg.	"
4/19/16	XVI	9	"	3-7 "	153.3	0.3–17.0	91 "	2 "	"	"	"
6/19/16	XX	16	"	3-7 "	88.8	0.3–10.0	98 "	3 "	"	"	"
6/22/16	XXI	17	"	3-7 "	135.8	0.3–13.0	111 "	1 "	"	"	"
8/9/16	XXIII	26	"	3-7 "	370.0	0.3–20.0	173 "	1 "	"	"	"
10/11/16	XXIV	30	"	3 "	98.8	0.3–13.0	92 "	10 "	"	Albuminuria, casts	"
10/13/16	XXV	31	"	3-7 "	1.8	0.3–1.0	9 "	1 "	"	Neg.	"
10/23/16	XXVI	33	"	3 "	4.6	0.3–2.0	47 "	6 "	"	"	"
11/3/16	XXVIII	36	"	3 "	153.8	0.3–15.0	72 "	1 "	"	"	"
12/30/16	XXIX	37	"	3 "	3.3	0.3–1.5	13 "	1 "	"	"	"
1/22/17	XXX	44	"	3 "	3.3	0.3–1.5	13 "	1 "	"	"	"
3/19/17	XXXV	51	"	3 "	224.3	0.3–18.0	84 "	1 "	"	Albuminuria	"
3/19/17	XXXVI	52	"	3 "	30.3	0.3–7.0	33 "	2 "	"	Neg.	"
3/20/17	XXXVII	53	"	3 "	102.0	0.3–12.0	53 "	1 "	"	"	"
3/19/17	XXXVIII	54	"	3 "	144.3	0.3–15.0	67 "	4 "	"	Albuminuria	"
3/20/17	XXXIX	55	"	3 "	12.3	0.3–4.0	25 "	3 "	"	"	"
3/20/17	XL	56	"	3 "	323.3	0.3–25.0	108 "	2 "	"	"	"
3/24/17	XLI	57	"	3 "	23.3	0.3–6.0	28 "	1 "	"	Neg.	"
3/24/17	XLII	58	"	3 "	57.3	0.3–10.0	42 "	1 "	"	"	"
3/31/17	XLIII	59	"	3 "	28.5	0.5–7.0	32 "	8 "	"	"	"
5/1/17	XLIV	60	"	3 "	158.5	0.5–20.0	66 "	2 "	"	"	"
5/1/17	XLV	61	"	3 "	148.5	0.5–18.0	66 "	2 "	"	"	"
5/5/17	XLVIII	64	"	3 "	15.5	0.5–5.0	18 "	1 "	"	Slight albuminuria	"
5/5/17	L	66	"	3 "	10.5	0.5–4.0	15 "	2 "	"	Neg.	"
5/5/17	LI	67	"	3 "	21.8	0.3–6.0	29 "	2 "	"	"	"

TABLE IV—RABBIT

Date	Experiment No.	Animal No.	Staphylococcus aureus	Age of culture	No. of c. c. injected	Dose (in c.c.)	Length of life after first injection	Length of life after last injection	Method of injection	Urinary changes	Amyloid
5/4/16	XVII	12	Killed	48 hours	99.3	0.3–13.0	77 days	2 days	Intravenously	Albuminuria	Neg.
5/26/16	XVIII	13	"	48 "	441.8	0.3–15.0	249 "	1 "	"	Neg.	"
5/26/16	XIX	14	"	48 "	1.8	0.3–1.0	9 "	2 "	"	"	"
8/4/16	XXII	20	"	48 "	158.0	0.5–14.0	167 "	7 "	"	"	"
10/27/16	XXVII	35	"	48 "	37.0	0.3–8.0	66 "	1 "	"	"	"
1/31/17	XXXI	45	"	48 "	11.3	0.5–3.0	32 "	1 "	"	"	"
1/31/17	XXXII	46	"	48 "	20.3	0.3–5.0	41 "	1 "	"	"	"
3/16/17	XXXIII	47	"	48 "	131.3	0.3–15.0	73 "	6 "	"	Albuminuria	"
3/16/17	XXXIV	48	"	48 "	156.3	0.3–16.0	77 "	3 "	"	"	"
5/5/17	XLVI	62	"	48 "	10.8	0.3–4.0	23 "	6 "	"	Neg.	"
5/5/17	XLVII	63	"	48 "	38.8	0.3–8.0	41 "	3 "	"	"	"
5/5/17	XLIX	64	"	48 "	3.8	0.3–2.0	12 "	3 "	"	"	"

during the early stages of the experiment and only later began to show albuminuria and casts.

Other authors, such as Neisser and Wechsberg, Stoddard and Woods, and Major, have also found lesions in the kidney after the injection of cultures or filtrates from bouillon cultures of Staphylococcus aureus. Although Jackson and Le Count found spontaneous renal lesions in 11 out of 50 rabbits, Major, in examining a large number of normal rabbits, found that none of them showed such extensive changes as in those subjected to the staphylococcus injections.

No conclusions concerning the chief point of this problem can be reached from the present series of experiments, since no amyloid degeneration was produced, but it is at least shown that the artificial production of amyloid is very difficult and inconstant, even when methods are employed which have sometimes been successful. Renal lesions are produced, it is true, but it appears that the factor responsible for the production of amyloid is as yet unrecognized.

In conclusion, it gives me great pleasure to extend my thanks to Drs. Welch and Winternitz for their many helpful suggestions and directions.

I also wish to thank Dr. Bayne-Jones for the supply of bacteria, and Dr. Dayton for help in the arrangement of instruments.

Moreover, I take pleasure in expressing to Dr. Janeway and Dr. Hooker my sincere appreciation of the facilities afforded by them and directions as to examination of blood pressure, and also to Dr. Garrison in the Surgeon General's Office in Washington for his kindness in translating some foreign journals for me.

BIBLIOGRAPHY

1. Birch-Hirschfeld: Lehrbuch d. path Anat., 1882, I, 45.
2. Bouchard and Charrin: Compt. rend. Soc. biol., 1888, III, 688.
3. Bailey: J. Exp. Med., 1916, XXIII, No. 6, 773.
4. Condorelli and Mangeri: Centralbl. f. allg. Path., V, 417.
5. Czerny: Centralbl. f. allg. Path. u. path. Anat., VII, 282.
6. Davidson, Virchow's Arch., CL, 16; Virch. Arch., CLV, 382; Virch. Arch., CXCII, 226.
7. Dantschakow: Virchow's Arch., CLXXXVII, 1.
8. Frank: Münch. med. Wchnschr., 1916, Nr. 13, 452.
9. Gianturco: Giornale della Associazone Napoletane di medici e naturalisti, 1891-2, II, 369.
10. Hoskins-Wheelon: Amer. Journ. of Physiol., 1914, XXXIV, Nos. 1-2, 172.
11. Janeway: Proc. Soc. Exp. Biol. and Med., 1909, VI, 108.
12. Jackson and Le Count: Tr. Chicago Path. Soc., 1914, IX, 112.
13. Krawkow: Centralbl. f. allg. Path. u. path. Anat., 1895, VI, 337.
14. Lubarsch: Virchow's Arch., CL, 471.
15. Lewis: Jour. Med. Research, 1906, XV, 449.
16. Maximow: Virchow's Arch., CLIII, 353.
17. Mihailowitch: Wratsch, 1896, 1085.
18. Markus: Tijdschr. v. veeartsenijk. Maanbl., 1904-05, XXXII, 99.
19. Major: Jour. Med. Research, 1917, XXXV, No. 3, 349.
20. Nowak: Virchow's Arch., CLII, 162.
21. Neisser-Wechsberg: Zeitschr. f. Hygiene, 1901, XXXVI, 299.
22. Petrone: Arch. de méd. expérim., 1897, 1146.
23. Pease and Pearce: Journ. infect. Dis., 1916, III, 619.
24. Raubitschek: Verhandl. d. deutsch. path. Gesell., 1910, 273.
25. Sczegolew: Arch. russ. de path., 1896, 409.
26. Schepilewsky, Centralbl. f. Bacteriol., 1899, XXV, 849.
27. Schoukewitch: Arch. d. sc. biol., 1907, XII, 190.
28. Stoddard-Woods: J. Med. Research, 1916, XXXIV, 343.
29. Tarchetti: Deutsch. Arch. f. klin. Med., 1902-3, LXXV, 526.
30. Werner: Mitteil. aus d. tierärzt. Praxis im Preuss. Staate, 1875, 166.
31. Zenoni: Centralbl. f. allg. Path. u. path. Anat., 1902, XIII, 334.

ABSTRACTS OF PAPERS

Representing Work Done in The Johns Hopkins Hospital, but Published or to be Published Elsewhere than in the Bulletin. Prepared by the Authors.

THE USE OF FREE GRAFTS OF WHOLE-THICKNESS SKIN FOR THE RELIEF OF CONTRACTURES[1]

By JOHN STAIGE DAVIS, M. D., F. A. C. S., Baltimore, Md.

(Abstract from Surg., Gynec. and Obst., 1917)

The contractures considered are those following burns, injuries and infections, in which the skin and often the subcutaneous tissue has been completely destroyed. Many methods have been suggested and tried for their relief.

The use of pedunculated flaps is especially valuable when a pad of fat is required in addition to the whole thickness of the skin, but this method can be used only in selected cases. The small thin grafts of Reverdin and the larger grafts of Ollier-Thiersch are not, as a rule, effective, especially in exposed positions, both on account of the danger of recontraction under the graft and also because of the instability of the result. The large graft of whole thickness furnishes a solution of the problem which I have found most satisfactory.

[1] Read before the Southern Surgical Association, December, 1916.

TECHNIC. *Preparation of the Area to Receive the Graft.*—All of the scar tissue should be excised, if this can be done with safety, but in many instances the entire part is covered with scar and in these only the contracture should be entirely excised, while the movable scar tissue beyond should be utilized.

It is of the utmost importance that the raw surface on which the graft is placed be perfectly dry. If the graft is placed on an oozing wound, the chances are that a blood clot will form beneath it, and this will often seriously interfere with its new blood supply.

Whole-thickness grafts may also be successfully placed on undisturbed healthy granulations which are level with the skin edges.

Cutting and Placing the Graft.—Mark out lightly with a scalpel on the skin an elongated ellipse, bearing in mind that the edges of the wound caused by removal of the graft should be approximated with but little tension. Remove the skin with the underlying fat down to the fascia or aponeurosis covering the muscle. As soon as the scalpel has penetrated the subcu-

taneous fat the skin immediately shrinks about two-thirds of its original size transversely, and a little less in its length, and this shrinkage must be planned for. Wrap the graft in dry gauze until the wound from which it is taken is sutured and dressed. Then trim off all the fat from the graft with curved scissors. Perforate the graft in several places to allow the escape of any blood or secretions which may collect. Fit the graft into the defect, either in one piece or in several pieces, depending on the shape of the wound. If one piece can be used, it is advisable to secure it without tension by four cardinal sutures. In some instances a continuous horse-hair suture is used to fill in between the cardinal sutures, and in others a few interrupted sutures. Occasionally no sutures are used, as the graft adheres closely to the dry wound, but in these instances the graft should be secured by means of rubberized mesh. A slight even pressure should be exerted on the graft to hold it firmly against its base, but too much pressure should be avoided, as it interferes with the vitality of the graft. The graft should be handled as little as possible.

I consider it essential that the wound from which the graft is taken should be closed at once. It is better to have the graft too large than too small. It is desirable to fill a defect with a single piece of skin, as there are fewer resulting scars, but this is often impossible.

Dressings.—Silver foil; dry gauze; moist salt gauze which is kept wet, or which is allowed to dry out, are all excellent dressings. Another dressing which I have found useful is a flexible paraffin mixture used by Carrel for another purpose.

In children under 10 years of age, I find that it is always advisable to put the part up in a plaster cast. If there are no contraindications I do not disturb this cast for at least three weeks.

Anesthetic.—A general anesthetic is usually necessary in order to remove the contracture and to prepare the wound for the graft, but whole-thickness grafts may be easily secured and successfully transplanted with the use of a local anesthetic.

Iso- and Zöo-Grafts.—There is much difference of opinion as to the advisability of utilizing iso-grafts, but I feel convinced that, when it is not possible to utilize auto-grafts, iso-grafts are well worth trying.

Many successes have been reported following the use of zöo-grafts. My own experience is that these grafts take readily and receive their blood supply as promptly as ordinary grafts, but eventually they disappear.

Remarks.—Contractures are more likely to follow in those cases which heal by granulation. They are much less likely to occur in cases where the healing is properly assisted by skin grafting, or by plastic operation.

When contracture of an eyelid is dealt with, it is seldom possible to remove all the scar, but all tension can be relieved. It is advisable to markedly over-correct in relieving these deformities, as the subsequent shrinkage of the scar, and wrinkling and folding of the skin in this situation have to be taken into consideration.

A graft of whole thicknesss may be placed successfully in the midst of movable scar tissue, and accomplish its purpose.

Gentle massage of the grafted area should be started several weeks after operation, and the manipulation gradually increased until the graft moves freely with the surrounding skin.

The operative procedure in securing thick grafts is undoubtedly much greater than in securing thin grafts, and occasionally the after-care is difficult and tedious, but the healing following a successful whole-thickness graft is as stable, firm and pliable as the original skin.

Contractures causing complete or partial loss of function, and accompanied by hideous and crippling deformities, may be relieved by the use of free grafts of whole-thickness skin, and the part restored to its former usefulness.

A RACK FOR FACILITATING THE HANDLING OF SMALL DEEP SKIN GRAFTS

By John Staige Davis, M. D., F. A. C. S., Baltimore, Md.

(Published in the Jour. Amer. Med. Assoc., 1917)

The appliance is used for facilitating the handling of small deep skin grafts. When two or more men are working on a large wound, the grafts are often cut faster than they can be applied, and there may be no convenient way of stacking the artery clamps holding needles and grafts. In consequence an instrument is often upset or slips; the graft is brushed off, and is lost or else much time is wasted in trying to pick it up. In order to eliminate this inconvenience, I have devised a slotted metal rack to hold the clamps.

The rack is made of 18-gauge sheet copper, which is bent so that the end view shows the form of a trapezium. The longest side of this figure is used as the base, and to facilitate cleansing is open, except for three strips which are necessary to brace it. The 12 slots are made on the side opposite the base and each is wide enough to admit the ordinary Halsted artery clamp.

The measurements of the rack are as follows: Base, 9 cm. long. Surface carrying slots, 6.5 cm. long. Sides, 5.5 and 6.5 cm. long. The full length of the rack is 15 cm.

The rack can be used with great comfort when one man is cutting and also placing the grafts. The 12 slots are filled and the rack is then moved close to the wound to be grafted, and all the grafts are then applied, the maneuver being repeated as often as necessary. It can readily be seen that an enormous amount of labor is thus saved, since without this frame each graft would have to be placed on the wound as it was cut.

If more space is desired, a longer rack or two racks could be used.

When a large wound is being grafted with small deep grafts, the method of procedure is as follows: The rack, with its highest side towards the operator, is placed in a convenient position. Then, as the grafts are cut, the clamps are dropped into the slots, and when the cutting is faster than the placing, the clamps are moved along progressively towards the placer, by the nurse, so that those grafts first cut will be applied first.

THE INTERRELATION OF THE SURVIVING HEART AND PANCREAS OF THE DOG IN SUGAR METABOLISM—SECOND PAPER

By ADMONT H. CLARK

(From the Department of Pathology, Johns Hopkins Hospital and University)

(To appear in full in the Journal of Experimental Medicine)

1. When a sterile, oxygenated Locke's solution, containing dextrose in physiological concentrations, is perfused aseptically through the pancreas of a dog, the optical rotation of the perfusate is diminished but there is no change in the reducing properties. An osazone with a lower melting point than glucosazone can be obtained from the perfusate. Hydrolysis of the perfusate tends not only to restore the original rotation but also yields an osazone with the same melting point as glucosazone. These changes take place also if dextrose is added to a pancreatic perfusate and the mixture subsequently allowed to incubate. An extract of a portion of the same pancreas does not bring about these changes. With a Locke's solution containing levulose, however, neither the optical rotation nor the reducing properties are altered by perfusion through the pancreas. A Locke's solution which contains both dextrose and levulose, and is therefore balanced in its rotation between the two sugars, when perfused through a pancreas, shows a displacement of the balance to the left. The reducing properties of such a perfusate remain unchanged and hydrolysis, again, increases the positive rotation. The spleen perfused with the same balanced solution shows neither a shift in the optical rotation nor a diminished reducing power. The preceding facts can be accounted for only by a specific action of the pancreas on dextrose.

2. When a living dog's heart is perfused aseptically with physiological concentrations of dextrose or levulose in oxygenated Locke's solutions and the final perfusates hydrolized, there is no increase on hydrolysis in the amount of reduction, nor any significant change in the optical rotation. A similar negative effect is obtained when a pancreatic perfusate containing levulose is circulated through an actively beating heart. It is only when a pancreatic perfusate containing dextrose is fed to a heart that a perfusate is obtained, which on hydrolysis gives a definite increase both in reduction and in optical rotation. The change in rotation is additional to the preliminary effect of the pancreas, and the increased reduction on hydrolysis is evidence that the change produced by a pancreas alone is qualitatively different from that produced by the combined action of the heart and pancreas.

When a balanced Locke's solution of dextrose and levulose is perfused through a heart alone there is a definite utilization of sugar as shown by the diminished reduction, but the optical rotation is only slightly shifted, if at all, to the left. This shows that both sugars have been used. Hydrolysis of the perfusate, also, gives no material change in its reducing properties or rotation. Such a balanced Locke's solution, however, under the combined action of the pancreas and heart, after correction for the preliminary change of rotation due to the pancreas, gives a striking and marked displacement of the rotation to the left, indicating that the selective utilization of dextrose has been greatly accelerated. Hydrolysis, also, gives a partial restoration of the original balance in rotation.

Further evidence for the specific relation which the combined pancreas and heart have for dextrose is obtained from the action of bromine on Locke's solutions containing both dextrose and levulose, which have been perfused through the heart alone and through both the pancreas and the heart. If the dextrose is removed from the perfusate by destructive action of bromine, the heart taken alone is found to have used a considerable amount of levulose, whereas the heart and pancreas together select the dextrose, leaving the levulose fraction practically untouched.

Finally, the heart, perfused with dextrose, does not lower the melting point of osazone obtained from the final perfusate, whereas an osazone from a pancreas perfusate or heart pancreas perfusate has a distinctly lowered melting point. After hydrolysis of the perfusates, however, the melting points of the osazones correspond to that of glucosazone.

The explanation which at present seems to be most consistent with these facts and with those brought out in my previous work would seem to be as follows: The pancreas supplies to a perfusate some enzyme or enzymes which have a specific action on dextrose as compared to levulose, changing a certain portion of the dextrose to a simple form of polysaccharide. This polysaccharide has both a lower optical rotation, and a lower melting point of its osazone than dextrose. I should regard this sugar complex as either relatively unstable, being hydrolized during the reduction determination, or as having the same reducing properties as dextrose. When, however, the pancreatic perfusate is circulated through a living heart the optical rotation not only continues to diminish but a new change occurs. The reducing properties of the perfusate are now altered. Thus the effect of the heart seems to be the production of a change additional to that caused by the pancreas. The most probable explanation would seem to be a further polymerization of the sugar in the presence of the living heart to a more stable form with a diminished power of reduction.

From the experiments here reported, it cannot be determined whether the specific sensitization of the heart for dextrose is dependent merely upon the preliminary change in the sugar produced by the pancreas. It seems quite probable that the action of the pancreatic enzyme does not cease with a simple polymerization but that it initiates a number of changes, the subsequent steps of which are dependent upon the interrelation of the enzyme with the living heart. So far as the heart alone is concerned, there is a similarity in its action to that of an eviscerated diabetic animal as described by Macleod and Pearce. In both there is a certain apparent utilization of dextrose, but for the isolated heart, at least, this utilization is non-specific, for it occurs almost equally well with levulose. In both, however, there is a certain fundamental incompleteness in the the power to utilize sugar. With the heart, by supplying a pancreatic perfusate, a highly specific relation is established between it and the circulating dextrose, which not only causes an immediate and rapid utilization of dextrose, but

also brings about a certain condensation of dextrose which can be initiated by the pancreas alone.

This specific interrelation of the pancreas and heart to dextrose suggests that in normal sugar metabolism this pancreatic enzyme, or enzymes, may be necessary; that certain stages of synthesis and polymerization may be of importance as intermediate steps in carbohydrate utilization; and that when there is an insufficiency of the pancreatic function, though the body tissues are supplied with an abundance of dextrose which can be burned to a certain extent, yet the essential steps, by which dextrose is prepared for normal utilization, cannot take place.

A NEW METHOD FOR MAKING WASSERMANN ANTIGENS FROM NORMAL HEART TISSUE

By Clarence A. Neymann and Leslie T. Gager

(Abstract from Journal of Immunology, October, 1917)

After describing the methods in use for the production and tibration of Wassermann antigens, and giving an account of their investigations of the various lipoids of beef's heart which were prepared according to Erlandsen's method, the authors say:

"The diaminomonophosphatides which comprise over half by weight of the secondary alcohol soluble lipoids, have an extremely high antigenic value as well as a low anticomplementary and hemolytic titre. Therefore it is with this group that we are primarily concerned in making a good Wassermann antigen.

"Considering these facts and using the knowledge gained we propose the following methods for making antigens:

"Take a normal beef heart and remove all the endo- and pericardium, larger blood vessels and fat. Grind the heart muscle very fine and spread it in a thin layer on glass plates. Dry by means of an electric fan for 24 hours, turning the layer of tissue after 12 hours. A parchment-like dry sheet of tissue results. Break this up and grind it again, thus producing a fine dry powder. Put this in bags and dry in an incubator at 37° C. for several days. Extract with ether in a Sohxlet apparatus for 12 hours, or in an ordinary wide-mouthed bottle at room temperature five or six times until the supernatant ether is no longer colored yellow. The latter procedure takes from 8 to 10 days. The ether should cover the muscle powder to a depth of from 2 to 3 inches. Dry the powder by spreading it out on a sheet of paper for several hours. Now extract the powder with absolute or 95 per cent alcohol for 10 days. The alcohol should cover the powder to a depth of half an inch and it will gradually assume a light yellow color. Titrate the antigen thus obtained. Extract the powder a second time with alcohol for 14 days. Titrate this antigen.

"Both extracts will prove to be good plain extracts. Sometimes the second will be better than the first, for the diaminomonophosphatides seem to go into solution after some of the other groups of the secondary alcohol extract have been dissolved out.

"In order to produce an acetone insoluble extract the plain extracts are united, evaporated to dryness at room temperature by means of a fan and treated with an excess of ether. The ether-soluble portion is filtered off, allowed to evaporate, treated with an excess of acetone and the sticky brown residue is finally dissolved in a minimum quantity of absolute alcohol. The solution is then filtered and again titrated.

"This preparation consists almost entirely of diaminomonophosphatides and with 10 hearts prepared in succession has, each time given an antigen which bound at least 1 to 1600, and showed a low anticomplementary titre and no hemolytic properties.

"A cholesternized antigen can be made by adding 0.2 gm. of cholesterin to 100 c. c. of the plain extract or of the acetone-insoluble preparation. The cholesterin will dissolve very readily in either of these phosphatide solutions, much more readily than in the same amount of absolute alcohol. After the addition of cholesterin the antigen is again titrated.

"These antigens have been in use in our laboratory for the past six months. They have proven reliable in every way and have solved the problem of finding a certain and definite method of obtaining a reliable, fairly equal, and powerful product. Though these antigens pick up weaker positives than our former preparations they have never given false positives."

A NEW PATHOGENIC SPOROTRICHUM. FOUND IN A CASE OF ACUTE ARTHRITIS OF THE KNEE, FOLLOWING INJURY

By S. B. Wolbach, M. D., W. R. Sisson, M. D., and F. C. Meier, Ph. D.

(*From the Department of Pediatrics, The Johns Hopkins Hospital*)

Instances of infection with sporotricha following injury, in America, are of unusual interest in the consideration of presumably free living pathogenic fungi. The study of the culture from the case here presented has revealed a new variety of sporotrichum for which the name Sporotrichum councilmanii is proposed.

The culture of this organism was obtained from the knee-joint of a boy of 10 years. This patient received a puncture wound of the right knee from the nail of an ash barrel. Following the injury there took place within 12 days, signs and symptoms of an acute arthritis which could not be explained by the common causes of this condition. The swollen knee was aspirated repeatedly. Large quantities of sanguineous muco-purulent material were recovered. This showed microscopically numerous pus cells without the presence of demonstrable organisms. Cultures showed the presence of a fungus growth. Using a suspension of this fungus as an antigen, the patient's serum showed complete fixation in various dilutions. Similarly, agglutination tests with the patient's serum were positive up to dilutions of 1-100. The patient was observed at the hospital for six months. The condition of the knee was unimproved after the usual forms of treatment. X-ray examination showed no bony changes. Complete fixation of the joint took place. Shortly before his discharge from the hospital all signs of acute infection disappeared. A study of the pathogenicity of the fungus isolated from the patient's joint was made by injecting guinea-pigs and rabbits intraperitoneally,

by injecting rats intravenously and rabbits intraarticularly. By the first method the organism was found to be of low pathogenicity, causing a granulomatous lesion of the peritoneal lymph nodes. These animals did not succumb to the injection. The intravenously injected rats showed multiple focal abscesses in the brain, thoracic and abdominal organs. After the injection of the fungus into the knee-joint of the rabbit, an acute arthritis was produced which simulated in every way that of the patient.

Microscopically, the lesions resembled those of actinomycosis and the organisms of cutaneous blastomycosis and coccidioidal granuloma. The first reaction is the collection of polymorphonuclear leucocytes and endothelial cells about the organisms. Giant-cell formation and the taking up of the spores by endothelial cells and giant cells occur. The mycelial fragments always seem to disappear soon after injection. At the periphery of the lesions fibroidblast proliferation becomes active. The lesion progresses only following the germination of the spores with the production of branching filaments radially arranged. Late lesions consist of fibrous nodules containing foci of soft yellow necrotic material. The organism was early identified as a sporotrichum. It grows readily on all ordinary culture media at room temperature. The gross cultural appearance differs from most pathogenic sporotricha in that it produces a profuse areal growth of white cotton-like hyphæ. This has not been seen with the other sporotricha. Microscopically the hyphæ and spores are distinctly larger than those of other sporotricha. Furthermore, this organism does not produce lateral spores or conidia from vegetative hyphæ. Like other sporotricha there is great variation both in regard to the form of the growth and pigment production. Comparison of this organism with Sporotrichum schenkii and Sporotrichum beurmannii; and with cultures from a case of sporotrichosis described by Page, Frothingham and Paige, shows striking differences, especially the gross cultural appearances. Comparison also with descriptions of other isolated pathogenic sporotricha warrants us in considering this an hitherto undescribed form. It resembles most closely Sporotrichum jeanselmei in gross cultural characteristics, in pleomorphism and in luxuriance of growth upon simple media. It shows, however, a much greater tendency to areal growth of the filaments. Microscopically, it is different from all species in the absence of lateral clusters of spores. The form of the organism in lesions, namely, that of branching hyphæ, is unusual.

TITLES OF PAPERS APPEARING DURING THE YEAR, ELSEWHERE THAN IN THE BULLETIN, BY PRESENT AND FORMER MEMBERS OF THE HOSPITAL AND MEDICAL SCHOOL STAFF

ABEL, J. J., and PINCOFFS, M. C.
On the presence of albumoses in extracts of the posterior lobe of the hypophysis cerebri.—*Proc. Nat. Acad. Sc.*, Balto., 1917, iii, 507-517.

ABEL, J. J., PINCOFFS, M. C., and ROUILLER, C. A.
On the presence of albumoses in the tissues and in the blood, with special reference to their occurrence in the gastrointestinal mucosa. —*Am. J. Physiol.*, Balto., 1917, xliv, 320-343.

AUER, J., and GATES, F. L.
Experiments on the causation and amelioration of adrenalin pulmonary edema.—*J. Exper. M.*, Balto., 1917, xxvi, 201-220.

AUER, J., and KLEINER, I. S.
The effect of coagulation of the pancreas in situ.—*Proc. Soc. Exper. Biol. & Med.*, N. Y., 1917, xiv, 151-152.
Morphin hyperglycemia as a test for pancreatic deficiency.—*Ibid.*, xv, 2-3.

AUER, J., and MELTZER, S. J.
Prolonged constriction of the bloodvessels by subcutaneous injection of adrenalin into the ear of a rabbit. A demonstration. [Abstr.]—*Proc. Soc. Exper. Biol. & Med.*, N. Y., 1916, xiv, 54.

BAGLEY, C., JR.
Brain surgery.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 725-727.

BARKER, L. F.
The importance of a knowledge of syphilis, and especially of visceral syphilis for general medical diagnosis.—*Am. J. Syph.*, St. Louis, 1917, i, 149-178.
The study of the internal secretions: an introduction.—*Endocrinology*, Los Angeles, Cal., 1917, i, 1-4.
Typhoid fever with complications: intestinal hemorrhages, otitis media, recrudescence, decubitus, peripheral neuritis.—*Internat. Clin.*, Phila., 1917, 27. s., ii, 30-45.
Meningitis of unknown etiology, probably meningococcal.—*Med. Clin. N. Am.*, Phila., 1917, i, 47-72.
Clinic on two cases of fibrillation of muscular tissue. Case I. Atrial fibrillation in mitral stenosis and mitral insufficiency. Case II. Progressive (central) muscular atrophy (Vulpian-Bernhardt subvariety of the Aran-Duchenne type).—*Ibid.*, 73-100.
The wider field of work of the National Committee for Mental Hygiene.—*Ment. Hyg.*, Concord, N. H., 1917, i, 4-6.
Cerebrospinal fever, cholera Asiatica, plague. *In:* Practical treatment. (Musser & Kelly.) 1917, iv, 296-298.
The classification and relations of cardio-vascular-renal disease.—*South. M. J.*, Birmingham, Ala., 1917, x, 22-29.
On the growth of medical knowledge concerning the malady known as infantile paralysis, acute anterior poliomyelitis, or the Heine-Medin disease. [Abstr.]—*Ibid.*, 136.

BARKER, L. F., and BRIDGMAN, E. W.
Extreme prolongation of conduction time in the bundle of His. An example resulting from digitalis therapy.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 903-907.

BARKER, L. F., and MOSENTHAL, H. O.
On the control of the symptoms of diabetes insipidus by subcutaneous injections of extracts of the hypophysis cerebri (pars posterior and pars intermedia).—*Am. J. Urol.*, Balt., 1917, i, 449-467.

BARKER, L. F., and SPRUNT, T. P.
The treatment of some cases of so-called "pernicious" anemia: a regimen that has been found helpful.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1919-1927.

BATCHELOR, M. D., FORD, W. W., and BLACKFAN, K. D.
Some observations on intestinal bacteria in children.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 354-364.

BAYNE-JONES, S.
The blood-vessels of the heart valves.—*Am. J. Anat.*, Phila., 1917, xxi, 449-463.
Typhoid meningitis: with report of a case.—*Am. J. M. Sc.*, Phila., 1917, cliv, 55-63.
Equilibria in precipitin reactions. The coexistence of a single free antigen and its antibody in the same serum.—*J. Exper. M.*, Balt., 1917, xxv, 837-853; also *Stud. Rockefeller Inst. M. Research*, N. Y., 1917, xxvii, 239-255.

BAYNE-JONES, S., FELTON, L. D., and HUSSEY, R. G.
The reaction of the cerebrospinal fluid. Preliminary report on hydrogen-ion concentration as determined by the colorimetric method.—*Arch. Int. Med.*, Chicago, 1917, xix, 1085-1096.

BAYNE-JONES, S., WATERS, C. A., and ROWNTREE, L. G.
Roentgenography of the lungs. Roentgenographic studies in living animals after intratracheal injection of iodoform emulsion.—*Arch. Int. Med.*, Chicago, 1917, xix, 538-549.

BEALL, F. C.
The treatment of retroversion of the uterus.—*Texas State J. M.*, Fort Worth, 1917, xii, 428-30.

BERNHEIM, B. M.
The limits of bleeding considered from the clinical standpoint.—*Am. J. M. Sc.*, Phila., 1917, cliii, 575-583.
Sodium citrate blood transfusion. A comparison.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 359-363.

BLACKFAN, K. D.
Lead poisoning in children with especial reference to lead as a cause of convulsions.—*Am. J. M. Sc.*, Phila., 1917, cliii, 877-887.

BLACKFAN, K. D., and DANDY, W. E.
Internal hydrocephalus. Second paper.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 424-443.

BLACKFAN, K. D., FORD, W. W., and BATCHELOR, M. D.
Some observations on intestinal bacteria in children.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 354-364.

BLANTON, S.
Unusual case of speech inhibition.—*J. Abnorm. Psychol.*, Bost., 1917, xi, 325-327.
Retarded school children in Madison, Wisconsin.—*Psychol. Clin.*, Phila., Pa., 1917, x, 250-263.

BLOODGOOD, J. C.
Diagnosis of cancer.—*Boston M. & S. J.*, 1917, clxxvi, 317.
Cancer and the oral cavity.—*Dental Reg.*, Cincin., 1917, lxxi, 224-228.
The pre-existing lesions in the oral cavity and their relation to malignant diseases—*Dental Rec.*, Chicago, 1917, xxxi, 357-378.
Letter to the medical profession.—*Illinois M. J.*, Chicago, 1917, xxxii, 291-292.
The Carrel-Dakin treatment. A reply to Dr. Bevan. (Letter.)—*J. Am. M. Ass.*, Chicago, 1917, lxix, 2061-2062.
The prevention of cancer.—*Maryland M. J.*, Balt., 1917, lx, 68-70.
The duty of the medical man in the present crisis.—*Ibid.*, 164-166.
National standards for first aid.—*Penn. M. J.*, Athens, 1917, xx, 666-670.
Medical preparedness in the great drive for democracy.—*South. M. J.*, Birmingham Ala., 1917, x, 746-752; also *J. Florida M. Ass.*, Jacksonville, 1917, iv, 63-69.
The breast: lesions of the female breast. *In:* A treatise on regional surgery. (Binnie.) Phila., 1917, i, 557-630.
Surgical treatment of diseases of the thyroid gland. *In:* Practical treatment. (Musser & Kelly.) 1917, iv, 470-475.

BLUMER, G.
Food intoxication and poisoning by reptiles and insects. *In:* Practical treatment. (Musser & Kelly.) 1917, iv, 157-162. Rat-bite fever. *Ibid.*, 344.
A discussion of the deleterious effects of competitive athletics.—*Albany M. Ann.*, 1917, xxxviii, 151-163.
Report of a case of paramyoclonus multiplex (myokimia).—*Proc. Connect. M. Soc.*, New Haven, 1917, cxxv, 171-176.

BRANCH, J. R. B.
A day in the hospital.—*Yale Alumni Weekly*, Suppl., 1917, xxvi, 4.

BRIDGMAN, E. W., and BARKER, L. F.
Extreme prolongation of conduction time in the bundle of His. An example resulting from digitalis therapy.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 903-907.

BROOKS, B.
Studies in regeneration and growth of bone. The demonstration of new formed bone by intravital staining.—*Ann. Surg.*, Phila., 1917, lxv, 704-710.
Studies in bone regeneration; an experimental study of bone transplantation by means of a vital stain.—*Ibid.*, lxvi, 625-639.

BROWN, HELEN W. S.
The deforming influences of the home.—*J. Abnorm. Psychol.*, Bost., 1917, xii, 49.
A literary forerunner of Freud.—*Psychoanalyt. Rev.*, Lancaster, Pa., & N. Y., 1917, iv, 64-69.

BROWN, N. W.
Paroxysmal tachycardia in childhood.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 287-295.

BROWN, T. R.
The relationship between diseases of the mouth and general diseases.—*J. Nat. Dent. Ass.*, Huntington, Ind., 1917, iv, 866-877.
Some gastro-intesinal notes. The cause of the symptoms of gastroptosis—the significance of a congenitally high duodenum and of duodenal or pyloric adhesions, and the value of pyloroplasty in the treatment of such cases.—*Med. Clin. N. Am.*, Phila., 1917, i, 185-189.
Visceroptosis and chronic appendicitis.—*Ibid.*, 189-191.
The medical after-care of surgical patients after abnormal operations.—*Ibid.*, 191-193.

BUNTING, C. H., and YATES, J. L.
Results of treatment in Hodgkin's disease.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 747-751.

BURKET, W. C.
Changes in the peripheral blood consequent upon the diversion of the splenic blood into the general circulation.—*J. Exper. M.*, Balt., 1917, xxvi, 849-865.

BURNAM, C. F.
New growths of the mediastinum with special reference to their treatment with radium.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 989-996.

BURNS, J. E.
The bladder changes due to lesions of the central nervous system; their description and treatment.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxiv, 659-668.
Further observations on the use of thorium in pyelography.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 533-536; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 432.

BURNS, J. E., BURROWS, M. T., and SUZUKI, Y.
Studies on the growth of cells. The cultivation of bladder and prostatic tumors outside the body.—*J. Urol.*, Balt., 1917, i, 3-15.

BURROWS, M. T.
The oxygen pressure necessary for cellular activity.—*Am. J. Physiol.*, Bost., 1916-17, xlii, 614-615.
The oxygen pressure necessary for tissue activity.—*Am. J. Physiol.*, Balt., 1917, xliii, 13-21.
Some factors regulating growth.—*Anat. Record*, Phila., 1916-17, xi, 335-339.
The significance of the lunula of the nail.—*Ibid.*, 1917, xii, 161-166.

BURROWS, M. T., BURNS, J. E., and SUZUKI, Y.
Studies on the growth of cells. The cultivation of bladder and prostatic tumors outside the body.—*J. Urol.*, Balt., 1917, i, 3-15.

BURROWS, M. T., and NEYMANN, C. A.
Studies on the metabolism of cells *in vitro*. I. The toxicity of α-amino acids for embryonic chicken cells.—*J. Exper. M.*, Balt., 1917, xxv, 93-108.

BURROWS, M. T., and PARK, E. A.
The study of a small outbreak of poliomyelitis in an apartment house, occurring in the course of an epidemic in a large city.—*Arch. Int. Med.*, Chicago, 1917, xx, 56-78.

CAMAC, C. N. B., and POOL, E. H.
Pericardiotomy for suppurative pericarditis following pneumonia.—*Am. J. M. Sc.*, Phila., 1917, cliii, 509-528.

CAMPBELL, C. M.
The subnormal child; a survey of the school population in the Locust Point district of Baltimore.—*Ment. Hyg.*, Concord, N. H., 1917, i, 96-147.
Educational methods and the fundamental causes of dependency.—*Ibid.*, 235-240.
The mental health of the community and the work of the psychiatric dispensary.—*Ibid.*, 572-584.

CAULK, J. R.
Preliminary renal drainage with special reference to the two-stage operation on the kidney.—*Ann. Surg.*, Phila., 1917, lxv, 593-596.
Etiology of renal infections. [Abstr.]—*Interstate M. J.*, Chicago, 1917, xxiv, 228-232.
Sterility in the male. [Abstr.]—*Interstate M. J.*, St. Louis, 1917, xxiv, 541-544.
Ureter catheter drainage in the treatment of renal infections, with special reference to the infected hydronephrosis complicating pregnancy.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 675-677; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 673-674.

CAULK, J. R. and BARNES, F. M., JR.
Cystoscopic examination of the bladder in psychoses.—*J. Missouri M. Ass.*, St. Louis, 1917, xiv, 329-332.

CAULK, J. R., and GREDITZER, H. G.
Observations on the bladder in diseases of the central nervous system. An analytical study of 117 cases.—*Am. J. Syph.*, St. Louis, 1917, i, 42-57.

CECIL, A. B.
Surgical treatment of seminal vesiculitis.—*Calif. State J. M.*, San Fran., 1917, xv, 497-500.
Reflex retention of urine.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 440-443; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 441.

CECIL, H. L.
The use of kephalin to hasten coagulation and hemostasis after surgical operations.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 628-629.

CHESNEY, A. M.
Treatment of pneumonia by ethylhydrocuprein.—*Med. Rec.*, N. Y., 1917, xci, 86-87.
Treatment of pneumonia by optochin.—*New York M. J.* [etc.], 1917, cv, 235.
The latest period in the growth of bacteria.—*Stud. Rockefeller Inst. M. Research*, N. Y., 1917, xxvi, 503-534.

CHESNEY, A. M., and AMOSS, H. L.
A report on the serum treatment of twenty-six cases of epidemic poliomyelitis.—*J. Exper. M.*, Balt., 1917, xxv, 581-608; also *Stud. Rockefeller Inst. M. Research*, N. Y., 1917, xxvii, 125-152.

CHESNEY, A. M., and MOORE, H. F.
A study of ethylhydrocuprein (optochin) in the treatment of acute lobar pneumonia.—*Arch. Int. Med.*, Chicago, 1917, xix, 611-682.

CHURCHMAN, J. W.
A group of injuries in modern warfare.—*Boston M. & S. J.*, 1917, clxxvi, 113-116.

CLARK, A. H.
The interrelation of the surviving heart and pancreas of the dog in sugar metabolism.—*J. Exper. M.*, Balt., 1917, xxvi, 721-744.

CLARK, J. G.
New surgical problems due to the war.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 700.
Radium therapy in uterine hemorrhage of benign origin.—*Tr. Am. Gynec. Soc.*, 1917, xlii.
The surgical treatment of intestinal stasis.—*In:* Practical treatment. (Musser & Kelly.) 1917, iv, 665-666.

CLARK, J. G., and BLOCK, F. B.
Ultimate results following nephropexy in cases of symptomatic nephroptosis.—*Ann. Surg.*, Phila., 1917, lxvi, 479-487.

CLARK, J. G., and NORRIS, C. C.
Results following treatment of pelvic inflammatory lesions by surgical measures.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 33-39.

CLAUSEN, S. W., HILLER, ALMA, and MOSENTHAL, H. O.
The non-protein nitrogenous constituents of normal human muscle.—*Proc. Soc. Exper. Biol. & Med.*, N. Y., 1917, xiv, 170-171.

CLOUGH, MILDRED C.
The cultivation of tubercle bacilli from the circulating blood in miliary tuberculosis.—*Am. Rev. Tuberc.*, Balt., 1917, i, 598-621.

COBB, S., BAILEY, A. A., and HOLTZ, P. R.
On the genesis and inhibition of extensor rigidity.—*Am. J. Physiol.*, Balt., 1917, xliv, 239-258.

COLE, R. I.
Suggestions concerning the prevention and cure of acute lobar pneumonia.—*Am. J. Pub. Health*, Concord, N. H., 1917, n. s., vii, 548-554.
Report of studies concerning acute lobar pneumonia.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 505-508.

The neutralization of antipneumococcus immune bodies by infected exudates and sera.—*J. Exper. M.*, Balt., 1917, xxvi, 453-475.
The treatment of lobar pneumonia. The importance of determining the etiologic agent in each case of pneumonia and full discussion of the various methods of treatment; the use of digitalis in the early stages.—*Med. Clin. N. Am.*, Phila., 1917, i, 545-561.
The nature of pneumonia and the serum treatment.—*New York M. J.* [etc.], 1917, cv, 233-234.
Present status of serum therapy.—*New York State M. J.*, N. Y., 1917, xvii, 347-357.
The specific treatment of acute lobar pneumonia.—*Penn. M. J.*, Athens, 1916-17, xx, 345-351.

COLE, R. I., AVERY, O. T., CHICKERING, H. T., and DOCHEZ, A. R.
Acute lobar pneumonia, prevention and serum treatment.—*Monogr. Rockefeller Inst. M. Research*, N. Y., 1917, No. 7.

COLE, R. I., and CHICKERING, H. T.
Typhoid fever.—*In:* Practical treatment. (Musser & Kelly.) 1917, iv, 183-211.

COLE, R. I., and MOORE, H. F.
The production of antipneumococcic serum.—*J. Exper. M.*, Balt., 1917, xxvi, 537-561.

COLSTON, J. A. C., and YOUNG, H. H.
Injuries to the pancreas following operations on the right kidney.—*J. Urol.*, Balt., 1917, i, 179-191.

CONRAD, H. B.
A case of pneumonia of unusually short duration.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 296-300.

CULLEN, T. S.
The surgical methods of dealing with pelvic infections.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 134-146.
America's place in the surgery of the world.—*Ibid.*, 376-390.

CUSHING, H.
Tumors of the nervus acusticus and the syndrome of the cerebellopontile angle.—Phila. & Lond., 1917, W. B. Saunders Co., 296 p., 8°.
Anosmia and sellar distension as misleading signs in the localization of a cerebral tumor.—*J. Nerv. & Ment. Dis.*, N. Y., 1917, xliv, 415-423.

DANDY, W. E., and BLACKFAN, K. D.
Internal hydrocephalus. Second paper.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 424-443.

DAVIS, D. M.
The effect of dextrose given intravenously on blood composition and urinary secretion.—*Am. J. Physiol.*, Balt., 1917, xliii, 514-529.
The effect of calcium, water and other substances given intravenously on blood composition and urine secretion.—*J. Urol.*, Balt., 1917, i, 113-134.

DAVIS, D. M., and GORTON, W. S.
A modified Woodyatt pump.—*J. Urol.*, Balt., 1917, i, 135-138.

DAVIS, D. M., and ROSEN, R.
Surface sterilization of tissues for bacterial studies.—*J. Infect. Dis.*, Chicago, 1917, xxi, 327-337.

DAVIS, D. M., and STONE, H. B.
Studies on the development of toxicity in intestinal secretion.—*J. Exper. M.*, Balt., 1917, xxvi, 687-691.

DAVIS, E. G., and YOUNG, H. H.
Double ureter and kidney, with calculous pyonephrosis of one half; cure by resection. The embryology and surgery of double ureter and kidney.—*J. Urol.*, Balt., 1917, i, 17-32.

DAVIS, J. S.
A comparison of the permanence of free transplants of bone and cartilage.—*Ann. Surg.*, Phila., 1917, lxv, 170-174.
Some of the problems of plastic surgery.—*Ibid.*, lxvi, 88-94.
A rack for facilitating the handling of small deep skin grafts.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 997-998.
The use of relaxation incisions in dealing with extensive unstable scars.—*Ibid.*, 2085-2986.
The use of free grafts of whole thickness skin for the relief of contractures.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 1-8.
The pathology of the major vestibular ducts and glands.—*Tr. Am. Ass. Obst. & Gynec.*, 1916, York, 1917, xxix, 177-206.

DICK, GLADYS R., and DICK, G. F.
The bacteriology of the urine in focal infections; its relation to nephritis.—*Arch. Int. Med.*, Chicago, 1917, xix, 493-498.

DICKSON, E. C.
Botulism; the danger of poisoning from vegetables canned by the cold-packed method.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 966-968.

DUNTON, W. R., JR.
The examination of patients suspected of being insane.—*Med. Rec.*, N. Y., 1917, xcii, 497-499.
History of occupational therapy. Occupation for patients advocated by Benjamin Rush in the eighteenth century—many in early times recognized the therapeutic value of work—early work of Bethlehem Hospital abroad and McLean Hospital in this country.—*Mod. Hosp.*, St. Louis, Mo., 1917, viii, 380-382.

EMMONS, A. B., 2D.
Obstetrics. A brief review and a look to the future.—*Am. J. Obst.*, N. Y., 1917, lxxv, 636-644.
Prenatal care—an opportunity for the medical profession.—*Ibid.*, lxxvi, 401-405.
The young doctor and health insurance. (Editorial.)—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 651-652.

ERLANGER, J.
The movements of the artery within the compression chamber during indirect estimations of the blood pressure.—*Am. J. Physiol.*, Bost., 1916-17, xlii, 588-589.
Further observations on the mechanism of the arterial compression sounds of Korotkoff; the preanacrotic phenomenon.—*J. Missouri M. Ass.*, St. Louis, 1917, xiv, 258.
The rôle of Boyle's law in clinical sphygmomanometry. A reply to A. M. Bleile.—*Science*, Lancaster, Pa., 1917, xlv, 384-385.

ERLANGER, J., GESELL, R., GASSER, H. S., and ELLIOTT, B. L.
An experimental study of surgical shock. Preliminary report.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 2089-2092.

ERLANGER, J. and WOODYATT, R. T.
Intravenous glucose injections in shock.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1410-1414.

EVANS, F. A.
Gaucher splenomegaly in a child.—*Tr. New York Path. Soc.*, 1916-17, xvi, 114-124.

EVANS, H. M., and BARTELMEZ, G. W.
A human embryo of seven to eight somites.—*Anat. Record*, Phila., 1916-17, xi, 355.

FELTON, L. D., HUSSEY, R. G., and BAYNE-JONES, S.
The reaction of the cerebrospinal fluid. Preliminary report on hydrogen-ion concentration as determined by the colorimetric method.—*Arch. Int. Med.*, Chicago, 1917, xix, 1085-1086.

FELTON, L. D., and MAXCY, K. F.
The colloidal gold reaction of the cerebrospinal fluid in acute poliomyelitis.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 752-754.

FINNEY, J. M. T.
The diagnosis and choice of operation in certain affections of the stomach and duodenum.—*New York State J. M.*, N. Y., 1917, xvii, 203-210.

FINNEY, J. M. T., and FRIEDENWALD, J.
Gastric polyosis.—*Am. J. M. Sc.*, Phila. & N. Y., 1917, cliv, 683-689.

FINNEY, J. M. T., and WALKER, G.
Abrogate the patent on salvarsan. (Letter.)—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1572-1573.

FISHBAUGH, E. C.
Spontaneous anastomosis between transverse colon and duodenum.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 624-627.

FISHER, A. L.
Syphilitic bone and joint lesions simulating tuberculosis.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 366-367.

FLEXNER, S.
Epidemic poliomyelitis: its nature and mode of infection.—*Am. J. M. Sc.*, Phila., 1917, cliii, 157-160.
Mode of infection, means of prevention and specific treatment of epidemic meningitis.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 639-645; 721-726; 817-821.
If infantile paralysis comes this summer.—*Med. Insur. & Health Conserv.*, Dallas, 1917, xxvi, 244-347.
Mechanisms that defend the body from poliomyelitic infection, (a) external or extra-nervous, (b) internal or nervous.—*Proc. Nat. Acad. Sc.*, Balt., 1917, iii, 416-418.
Recent advances in knowledge of poliomyelitis. Address before N. Y. Committee on After Care of Infantile Paralysis Cases. New York Academy of Medicine, May, 1917. (Published by N. Y. Committee on After Care of Infantile Paralysis Cases.)

FLEXNER, S., and AMOSS, H. L.
The passage of neutralizing substances from the blood into the cerebrospinal fluid in poliomyelitis.—*J. Exper. M.*, Balt., 1917, xxv, 499-505; also *Stud. Rockefeller Inst. M. Research*, N. Y., 1917, xxvii, 43-49.
The relation of the meninges and choroid plexus to poliomyelitic infection.—*Ibid.*, 525-537; also *ibid.*, 69-81.
Survival of the poliomyelitic virus for six years in glycerol.—*Ibid.*, 539-543; also *ibid.*, 83-87.

FLINT, J. M.
The healing of gastro-intestinal anastomoses.—*Ann. Surg.*, Phila., 1917, lxv, 202-221.
A combined method for the localization and extraction of projectiles.—*Mil. Surg.*, Wash., 1917, xl, 259-273.

FORD, W. W., BLACKFAN, K. D., and BATCHELOR, M. D.
Some observations on intestinal bacteria in children.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 354-364.

FRONTZ, W. A., and YOUNG, H. H.
Preliminary treatment for prostatectomy in unfavorable cases.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 526-530; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 431-432.

FUTCHER, T. B.
Acromegaly.—*Med. Clin. N. Am.* Phila., 1917, i, 131-143.
Combined scleroderma, Raynaud's disease, and chronic arthritis.—*Ibid.*, 145-154.
Diabetes insipidus.—*In:* Practical treatment. (Musser & Kelly.) 1917, iv, 508-509.
Arthritis deformans.—*Ibid.*, 510-512.
Gout.—*Ibid.*, 513-515.
Lithemia, uric acid diathesis.—*Ibid.*, 516.

GATCH, W. D.
Anesthesia in curriculum and clinic.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 367-371.

GERAGHTY, J. T.
The rôle of the seminal vesicles in persistent nongonorrheal infections of the posterior urethra and bladder.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 757-759.
The results of treatment of bladder tumors.—*Ibid.*, lxix, 1336-1342.
Renal functional tests.—*South. M. J.*, Birmingham, Ala., 1917, x, 194-197.
Infections of the bladder with special reference to localized resistant areas of cystitis.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxiv, 655-658.
Present status treatment of bladder tumors.—*West Virg. M. J.*, Huntington, 1916-17, xi, 193-199.

GIFFIN, H. Z.
Observations on the treatment of myelocytic leukemia by radium.—*Boston M. & S. J.*, 1917, clxxvii, 686-691.
A report on the treatment of pernicious anemia by transfusion and splenectomy.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 429-432; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 341.
Haemolytic jaundice: a review of seventeen cases.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 152-161.

GOETSCH, E.
The relation of the pituitary gland to the female generative organs.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 229-243.

GOLDBACH, L. J.
Lymphatic-nodular keratoconjunctivitis (phlyctenules).—*J. Am. M. Ass.*, Chicago, 1917, lxix, 102-104.

GOODPASTURE, E. W.
An acid polychrome-methylene blue solution for routine and special staining.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 998.
A contribution to the study of pancreas intoxication.—*J. Exper. M.*, Balt., 1917, xxv, 277-283; also *Stud. Rockefeller Inst. M. Research*, N. Y., 1917, xxvi, 103-109.
Crystalline hyalin.—*J. Med Research*, Bost., 1917, xxxv, 259-264.

GORHAM, L. W.
Acute myelogenous leukaemia. The report of two cases with positive oxydase reaction.—*Albany M. Ann.*, 1917, xxxviii, 201-238.

GORTON, W. S., and DAVIS, D. M.
A modified Woodyatt pump.—*J. Urol.*, Balt., 1917, i, 135-138.

GREY, E. G.
The diversion of the pancreatic juice from the duodenum into the stomach. Its effects upon the level of gastric acidity and upon the pancreas.—*J. Exper. M.*, Balt., 1917, xxvi, 825-840.

GUNDRUM, F. F., and HALE, N. G.
Intestinal infection in the Sacramento Valley.—*Calif. State J. M.*, San Fran., 1917, xv, 157-158.

HAMMAN, L.
The diagnosis of pulmonary tuberculosis.—*Am. Rev. Tuberc.*, Balt., 1917, i, 206-217.
Hypertension. Its clinical aspects.—*Med. Clin. N. Am.*, Phila., 1917, i, 155-176.
Two unusual cases. 1. Dermoid cyst of the mediastinum. 2. Milroy's disease.—*Ibid.*, 177-184.

HAMMAN, L., and HIRSCHMAN, I. I.
Studies on blood sugar. I. Alimenhyperglycemia and glycosuria as a test of sugar tolerance.—*Arch. Int. Med.*, Chicago, 1917, xx, 761-808.

HENDERSON, D. K.
A case of pathological lying occurring in a soldier.—*Rev. Neurol. & Psychiat.*, Edinb., 1917, xv, 223-232.

HENNINGTON, C. W.
Gall bladder surgery—shall we drain or remove?—*Buffalo M. J.*, 1917, lxxii, 415-419.

HEUER, G. J.
A case of intrathoracic cyst with calcification.—*Am. Rev. Tuberc.*, Balt., 1917, i, 129-144.

HIGGINS, H. L.
Effect of alcohol on the respiration and the gaseous metabolism in man.—*J. Pharmacol. & Exper. Therap.*, Balt., 1916-17, ix, 441-472.

HIGGINS, H. L., and MARRIOTT, W. M.
A colorimetric method for the determination of the CO_2 percentage in air.—*J. Am. Chem. Soc.*, Easton, Pa., 1917, xxxix, 68-71.

HINMAN, F.
Urological diagnosis in general practice.—*Calif. State J. M.*, San Fran., 1917, xv, 392-401.
Early diagnosis of renal tumor: with the report of 5 cases and the demonstration of several pyelograms illustrative of the difficulty.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxiv, 669-680.

HITZROT, J. M.
Haemangioma cavernosum of bone.—*Ann. Surg.*, Phila., 1917, lxv, 476-482.
Subcutaneous injuries of the liver.—*Ibid.*, lxvi, 50-63.
Central fracture of the acetabulum: ankylosis of the hip due to bony fusion between the great trochanter and the ileum.—*Ibid.*, 106-107.
Complicated diacondylar fracture of the right humerus (old); arthroplasty.—*Ibid.*, 107-108.
Some phases of the present treatment of fractures.—*New York State J. M.*, N. Y., 1917, xvii, 338-340.

HOLMES, J. B.
Recent work in anatomy, physiology and pathology of childhood.—*Am. J. Dis. Child.*, Chicago, 1917, xiii, 174-202.

HOCH, A.
Recommendations for the observation of mental disorders incident to the war.—*Psychiat. Bull.*, Utica, 1917, ii, 377-385.

HOOKER, D. R.
Perfusion of the mammalian medulla: note on the action of ethyl alcohol.—*J. Pharmacol. & Exper. Therap.*, Balt., 1917-18, x, 121-128.

HOOKER, D. R., and WILSON, D. W.
The perfusion of the mammalian medulla: the effect of carbon dioxide and other substances on the respiratory and cardio-vascular centers.—*Am. J. Physiol.*, Bost., 1916-17, xlii, 612.

HOOKER, D. R., WILSON, D. W., and CONNETT, HELENE.
The perfusion of the mammalian medulla: the effect of carbon dioxide and other substances on the respiratory and cardio-vascular centers.—*Am. J. Physiol.*, Balt., 1917, xliii, 351-361.

HOWARD, C. P., and BAUMANN, L.
The mineral metabolism of experimental scurvy of guinea-pig.—*Am. J. M. Sc.*, Phila., 1917, cliii, 650-665.

HOWARD, C. P., and STEVENS, F. A.
The iron metabolism of hemochromatosis.—*Arch. Int. Med.*, Chicago, 1917, xx, 896-912.

HOWELL, W. H.
The coagulation of the blood. [Abstr.]—*New York M. J.* [etc.], 1917, cv, 841-842; also [Abstr.] *South. M. J.*, Birmingtam, Ala., 1917, x, 849.
Physiology of secretion.—*Ref. Handb. Med. Sc.*, N. Y., 3d ed., 1917, vii, 687-704.
Physiology.—*In:* Science and learning in France. [Chicago.] 1917, 175-178.

HOWLAND, J., and MARRIOTT, W. McK.
A micro method for the determination of calcium and magnesium in blood serum.—*J. Biol. Chem.*, Balt., 1917, xxxii, 233-239.

HOWLAND, J., and MARRIOTT, W. McK.
Treatment of acidosis in children. *In:* Practical treatment. (Musser & Kelly.) 1917, iv, 500-507.

HUNNER, G. L.
Surgical indications in urinary tract diseases.—*Ibid.*, 856-867.
Further studies on ureter stricture; report of one hundred cases.—*Wash. M. Ann.*, 1917, xvi, 281-290.

HURD, H. M.
State hospitals and agricultural preparedness. (Editorial.)—*Mod. Hosp.*, St. Louis, 1917, ix, 24.

HURD, H. M. [AND OTHERS]
The institutional care of the insane in the United States and Canada. V, iv, Balt., 1917, Johns Hopkins Press, 652 p., 8°.

HURWITZ, S. H.
Etiology and treatment of hemorrhagic diseases.—*Am. J. M. Sc.*, Phila. & N. Y., 1917, cliv, 689-707.
Intravenous injections of colloidal solutions of acacia in hemorrhage. Preliminary note.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 699-701; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 685.

HURWITZ, S. H., and WHIPPLE, G. H.
Studies on blood proteins. II. The albumin-globulin ratio in experimental intoxications and infections.—*J. Exper. M.*, Balt., 1917, xxv, 231-252.

HUSSEY, R. G., FELTON, L. D., and BAYNE-JONES, S.
The reaction of the cerebrospinal fluid. Preliminary report on hydrogen-ion concentration as determined by the colorimetric method.—*Arch. Int. Med.*, Chicago, 1917, xix, 1085-1096.

JACOBS, H. B.
Fund for Belgian and French physicians. (Letter.)—*J. Am. M. Ass.*, Chicago, 1917, lxix, 2063.

JANEWAY, T. C.
Address in medicine. Slight variations from normal structure and function, and their clinical significance.—*Canad. Med. Ass. J.*, Toronto, 1917, vii, 589-608.
Hodgkin's disease with extensive skin eruption.—*Med. Clin. N. Am.*, Phila., 1917, i, 1-20.
Postural albuminuria.—*Ibid.*, 21-32.
Diabetes associated with disturbances of the external secretion of the pancreas in a syphilitic.—*Ibid.*, 33-46.
War and medicine.—*Johns Hopkins Alumni Mag.*, Balt., 1917, v, 215-233.
Diabetes.—*In:* Practical treatment. (Musser & Kelly.) 1917, iv, 489-500.
Introductory survey of French medical science.—*In:* Science and learning in France. [Chicago.] 1917, 171-174.

JANNEY, J. H., and SHOHL, A. T.
The growth of bacillus coli in urine at varying hydrogen-ion concentrations.—*J. Urol.*, Balt., 1917, i, 211-229.

JELKS, E.
Osteochondritis deformans juvenilis.—*J. Florida M. Ass.*, Jacksonville, 1917, iii, 257-259; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 525; 529.
The advantages of the proper handling of acute appendicitis.—*J. Florida M. Ass.*, Jacksonville, 1917, iv, 37-39.

JONES, W., and READ, B. E.
Adenine-uracil dinucleotide and the structure of yeast nucleic acid.—*J. Biol. Chem.*, N. Y., 1917, xxix, 111-122.
The mode of nucleotide linkage in yeast nucleic acid.—*Ibid.*, 123-126.
Uracil-cytosine dinucleotide.—*Ibid.*, Balt., 1917, xxxi, 39-45.
The structure of the purine mononucleotides.—*Ibid.*, 337-342.

KEITH, N. M., and PULFORD, D. S., JR.
Experimental hydronephrosis, functional and anatomic changes in the kidney following partial ureteral obstruction.—*Arch. Int. Med.*, Chicago, 1917, xx, 853-878.

KELLY, H. A.
Methods and results of radium treatment of uterine hemorrhage due to other causes than malignancy.—*Tr. Am. Gynec. Soc.*, 1917, xlii.

KEMPF, E. J.
The social and sexual behavior of infra-human primates with some comparable facts in human behavior.—*Psychoanalyt. Rev.*, Lancaster, Pa., & N. Y., 1917, iv, 127-154.
The psychology of "The Yellow Jacket."—*Ibid.*, 393-423.

KEMPF, HELEN D. C.
The preferential use of the hands in monkeys with modifications by training and retention of the new habit.—*Psychol. Bull.*, Princeton, N. J., & Lancaster, Pa., 1917, xiv, 297-301.

KNOX, J. H. M., JR.
The value of the von Pirquet test as controlled by necropsy findings.—*Am. J. Dis. Child.*, Chicago, 1917, xiv, 47-51.
A case of hemorrhagic disease in the new-born treated by indirect transfusion.—*Arch. Pediat.*, N. Y., 1917, xxxiv, 771-772.
The place of infant welfare in public health instruction.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1156-1160.

KRAUSE, A. K.
The American review of tuberculosis. (Editorial.)—*Am. Rev. Tubero.*, Balt., 1917, i, 51-53.
Undergraduate instruction in tuberculosis.—*Ibid.*, 233-244; also *Med. Standard*, Chicago, 1917, xl, 315-320.
Community studies of tuberculosis. (Editorial.)—*Am. Rev. Tubero.*, Balt., 1917, i, 114-117.
Edward L. Trudeau; a study.—*J. Outdoor Life*, N. Y., 1917, xiv, 295-297.
The nature of resistance to tuberculosis.—*New York M. J.*, 1917, cv, 791-792; also *Am. Rev. Tubero.*, Balt., 1917, i, 65-82.

LANGNECKER, H. L.
The economic importance of the well poised person.—*Calif. State J. M.*, San Fran., 1917, xv, 256-259.

LEONARD, V. N., and DAYTON, A. B.
Fatal complications of Percy's "Cold Iron" method in the treatment of inoperable carcinoma of the cervix.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxiv, 156-161; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 260.

LEVY, R. L.
Facial paralysis following Pasteur antirabic treatment; report of a case of facial diplegia with onset seventy-three days after the beginning of prophylactic inoculations.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1873-1875.

LEWIS, D. S.
The clinical value of Ambard's coefficient of urea excretion.—*Arch. Int. Med.*, Chicago, 1917, xix, 1-52.

LEWIS, W. H., and LEWIS, MARGARET R.
Behavior of cross striated muscle in tissue cultures.—*Am. J. Anat.*, Phila., 1917, xxii, 169-194.

LYMAN, D. R.
When is the diagnosis of tuberculosis without positive sputum justified?—*Boston M. & S. J.*, 1917, clxxvii, 135-138.

MACCALLUM, W. G.
An apparatus for the study of the dissociation of oxyhemoglobin.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 523-524.

MCCLURE, R. D.
History of transfusion of blood, report of one hundred and fifty transfusions.—*J. Michigan M. Soc.*, Grand Rapids, 1917, n. s., xvi, 178-184; also [Abstr.] *Med. Rev. of Rev.*, N. Y., 1917, xxiii, 774-775.

MCCLURE, W. B., and AMBERG, S.
The occurrence of citric acid in urine.—*Am. J. Physiol.*, Balt., 1917, xliv, 453-462.

MCCLURE, W. B., AMBERG, S., and LOEVENHART, A. S.
The influence of oxygen upon inflammatory reactions.—*J. Pharmacol. & Exper. Therap.*, Balt., 1917-18, x, 209-236.

MCCRAE, T.
Remote symptoms from lesions of the prostate and deep urethra.—*Canad. M. Ass. J.*, Toronto, 1917, vii, 385-392.
Jaundice with enlarged liver in a young adult (primary carcinoma of the gall-bladder).—*Internat. Clin.*, Phila., 1917, 27. s., ii, 46-55.
Aortitis; the common neglect of examination of the aorta for disease other than aneurysm. Aortitis due to infectious diseases. Syphilitic aortitis. Aortitis and rheumatic fever. Illustrative case reports. Clinical features. Diagnosis. Treatment.—*Med. Clin. N. Am.*, Phila., 1917, i, 195-215.
Amebic dysentery.—*Proc. Path. Soc.*, Phila. (1916), 1917, xxxvii, 25.

MACHT, D. I.
The action of opium and some of its alkaloids on the digestive tract.—*Am. J. M. Sc.*, Phila., 1917, cliv, 874-883.
The absorption of apomorphin and morphin through the conjunctiva.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1230.
A case of poisoning by musterole.—*Ibid.*, lxix, 901.
Action of opium alkaloids on the ducts of the testis.—*J. Pharmacol. & Exper. Therap.*, Balt., 1916-17, ix, 121-127.
On the pharmacology of the ureter. III. Action of the opium alkaloids.—*Ibid.*, 197-216.
On the pharmacology of the ureter. IV. Action of hydrastin, hydrastinin, cotarnin, emetin and some pyridin derivatives, with a further analysis of the opium action.—*Ibid.*, 287-303.
On the pharmacology of the ureter. V. Action of nitrates and nitrites.—*Ibid.*, 427-430.
On the comparative effects of the opium alkaloids individually and in combination with each other on the gall bladder.—*Ibid.*, 473-481.
A contribution to the physiology of the ureter and the vas deferens.—*J. Urol.*, Balt., 1917, i, 97-111.
On the comparative influence of morphin and total opium alkaloids on renal colic.—*Ibid.*, 201-209.
A referat on trench nephritis.—*Virginia M. Semi-Month.*, Richmond, 1917, xxii, 240-241.

MACHT, D. I., and FISHER, H. G.
On the toxic action of opium alkaloids individually and in combination with each other on Paramecia.—*J. Pharmacol. & Exper. Therap.*, Balt., 1917-18, x, 95-104.

MACHT, D. I., and ISAACS, S.
Action of some opium alkaloids on the psychological reaction time.—*Psychobiology*, Balt., 1917, i, 19-32.

MAJOR, R. H.
The production of kidney lesions with staphylococcus aureus toxins.—*J. Med. Research*, Bost., 1917, xxxv, 349-356.
The production of acute and chronic kidney lesions with Bacillus mucosus capsulatus.—*Ibid.*, xxxvii, 125-137.

MALL, F. P.
On the frequency of localized anomalies in human embryos and infants at birth.—*Am. J. Anat.*, Phila., 1917, xxii, 27-72.
Cyclopia in the human embryo.—*Contrib. Embryol.* (Carnegie Inst.), Wash., 1917, vi, 7-33.

MARRIOTT, W. MCK., and HAESSLER, F. H.
Micromethod for determination of inorganic phosphates in blood serum.—*J. Biol. Chem.*, Balt., 1917, xxxii, 241-243.

MARRIOTT, W. MCK., and HAESSLER, F. H.
A colorimetric method for the determination of the CO_2 percentage in air.—*J. Am. Chem. Soc.*, Easton, Pa., 1917, xxxix, 68-71.

MARRIOTT, W. MCK., and HOWLAND, J.
Treatment of acidosis in children.—*In:* Practical treatment. (Musser & Kelly.) 1917, iv, 500-507.

MARSHALL, H. W.
Results of treatments for fractures of carpal bones.—*Boston M. & S. J.*, 1917, clxxvi, 333-337.

MASON, V. R., SYDENSTRICKER, V. P. W., and RIVERS, T. M.
Transfusion of blood by the citrate method.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1677-1680.

MAXCY, K. F.
Lange's colloidal gold reaction in anterior poliomyelitis.—*George Washington Univ. Bull.*, Wash., 1917, xvi, 35.

MAXCY, K. F., and FELTON, L. D.
The colloidal gold reaction of the cerebrospinal fluid in acute poliomyelitis.—*J. Am. Ass.*, Chicago, 1917, lxviii, 752-754.

MELOY, C. R.
Umbilical cord injections, associated with B. diphtheriae.—*Grace Hosp. Bull.*, Detroit, Mich., 1916-17, i, 3-7.
Hypernephroma with case report.—*Ibid.*, 1917-18, ii, 5-11.

MEYER, A.
The aims and meaning of psychiatric diagnosis.—*Am. J. Insan.*, Balt., 1917-18, lxxiv, 163-168.
The approach to the investigation of dementia praecox.—*Proc. Alienists & Neurol. Am.*, Chicago, 1917, vi, 147-151; also *Chicago M. Rec.*, 1917, xxxix, 441-445.
Progress in teaching psychiatry.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 861-863.
Mental and moral health in a constructive school program.—*In:* Suggestions of modern science concerning education. (Jennings, Meyer, *et al.*) N. Y., 1917, 101-156.
Modern conceptions of mental disease, and The problem of sex education.—*Ibid.*, 201-211.

MILLER, G. B.
A review of 300 obstetrical cases in private practice.—*Am. J. Obst.*, N. Y., 1917, lxxv, 798-808.

MINOT, G. R.
Diminished blood platelets and marrow insufficiency. A classification and differential diagnosis of purpura hemorrhagica, aplastic anemia, and allied conditions.—*Arch. Int. Med.*, Chicago, 1917, xix, 1062-1084.
Hemorrhagic conditions. [Abstr.]—*Boston M. & S. J.*, 1917, clxxvii, 222-223.

MINOT, G. R. and LEE, R. I.
Treatment of pernicious anemia, especially by transfusion and splenectomy.—*Boston M. & S. J.*, 1917, clxxvii, 761-775.
The significance of blood platelets.—*Cleveland M. J.*, 1917, xvi, 65-87.
Coagulation time of the blood in pneumonia.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 545-546.

MINOT, G. R., and SELLARDS, A. W.
The preparation of hemoglobin for clinical investigations.—*J. Med. Research*, Bost., 1917, xxxvii, 161-170.

MINOT, G. R., and WRIGHT, J. H.
The viscous metamorphosis of the blood platelets.—*J. Exper. M.*, Balt., 1917, xxvi, 395-409.

MINSK, L. D., and SAUER, L. W.
The nonprotein nitrogen of the blood in atrophic infants.—*Am. J. Dis. Child.*, Chicago, 1917, xiii, 397-403.

MITCHELL, J. F.
Diaphragmatic hernia. *South. M. J.*, Birmingham, Ala., 1917, x, 561-564.

MORRIS, R. S.
Defects in enforcing the preliminary requirements in English.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1937.
A comparison of the percussion and roentgen-ray findings after injection of the pericardium.—*Ibid.*, lxix, 450-454.
Tonsillectomy during course of acute rheumatic fever.—*J. Lab. & Clin. M.*, St. Louis, 1916-17, ii, 168-179.

MORRISS, W. H.
The prophylaxis of anesthesia acidosis.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1391-1394.

MORRISS, W. H., and SLEMONS, J. M.
The non-protein nitrogen and urea in the maternal and the fetal blood at the time of birth. [Abstr.]—*South. M. J.*, Birmingham, Ala., 1917, x, 160; 173.

MOSENTHAL, H. O.
Essential hypertension.—*Med. Clin. N. Am.*, Phila., 1917, i, 101-117.
The dietetic treatment of diabetes mellitus.—*Ibid.*, 119-130.

MOSENTHAL, H. O., and BARKER, L. F.
On the control of the symptoms of diabetes insipidus by subcutaneous injections of extracts of the hypophysis cerebri (pars posterior and pars intermedia).—*Am. J. Urol.*, Balt., 1917, i, 449-467.

MOSENTHAL, H. O., and HILLER, ALMA.
The relation of the non-protein nitrogen to the urea nitrogen of the blood.—*J. Urol.*, Balt., 1917, i, 75-89.

MOSENTHAL, H. O., HILLER, ALMA, and CLAUSEN, S. W.
The non-protein nitrogenous constituents of normal human muscle.—*Proc. Soc. Exper. Biol. & Med.*, N. Y., 1917, xiv, 170-171.

MOSS, W. L.
A simplified method for determining the iso-agglutinin group in the selection of donors for blood transfusion.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1905-1906.

NASSAU, C. F.
Closure of fecal fistula by extraperitoneal method.—*Penn. M. J.*, Athens, 1917, xx, 539-540.

NEYMANN, C. A.
Some experiences in the German Red Cross.—*Ment. Hyg.*, Concord, N. H., 1917, i, 392-396.

NEYMANN, C. A., and BURROWS, M. T.
The effect of α-amino acids and peptones on the growth of cells in vitro.—*Am. J. Physiol.*, Bost., 1916-17, xlii, 597.
Studies on the metabolism of cells in vitro. I. The toxicity of -amino acids for embryonic chicken cells.—*J. Exper. M.*, Balt., 1917, xxv, 93-108.

NEYMANN, C. A., and GAGER, L. T.
New method for making Wassermann antigens from normal heart tissue.—*J. Immunol.*, Balt., 1917, ii, 573-583.

NIXON, P. I.
Retroperitoneal hernia into the duodenal fossae.—*Ann. Surg.*, Phila., 1917, lxv, 456-461.

NOVAK, E.
Hyperplasia of the endometrium.—*Am. J. Obst.*, N. Y., 1917, lxxv, 996-1001.
Abdominal hemorrhage of ovarian origin: with report of a case due to rupture of a small follicular cyst.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1160-1162.
The organotherapy of menstrual disorders.—*Med. & Surg.*, St. Louis, 1917, i, 576-585.
Congenital absence of the uterus and vagina. With report of six cases.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 532-537.

OPIE, E. L.
The focal pulmonary tuberculosis of children and adults.—*J. Exper. M.*, Balt., 1917, xxv, 855-876.
The relation of apical tuberculosis of adults to the focal tuberculosis of children.—*Ibid.*, xxvi, 263-277.
Progressive muscular ossification (progressive ossifying myositis)—a progressive anomaly of osteogenesis.—*J. Med. Research*, Bost., 1917, xxxvi, 267-275.

OPIE, E. L., and ALLISON, N.
Hypertrophic chondrodystrophy in infancy and adolescence—a progressive anomaly of osteogenesis.—*J. Med. Research*, Bost., 1917, xxxvi, 277-294.

OSLER, SIR W.
Recurrence or redeposit of cancer?—*Brit. M. J.*, Lond., 1917, i, 455.
The campaign against syphilis.—*Lancet*, Lond., 1917, i, 787-792; also *Brit. M. J.*, Lond., 1917, i, 694-696.
War wastage: a note of warning to examiners of recruits.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 290.

PARFITT, C. D.
Tuberculosis often of secondary importance to other pathological conditions.—*Canad. M. Ass. J.*, Montreal, 1917, vii, 10-17.

PARK, E. A.
Extirpation of the thymus in the guinea-pig.—*J. Exper. M.*, Balt., 1917, xxv, 129-152.

PARK, E. A., and BURROWS, M. T.
The study of a small outbreak of poliomyelitis in an apartment house, occurring in the course of an epidemic in a large city.—*Arch. Int. Med.*, Chicago, 1917, xx, 56-78.

PEABODY, F. W.
A report of the Harvard Infantile Paralysis Commission on the diagnosis and treatment of acute cases of the disease during 1916.—*Boston M. & S. J.*, 1917, clxxvi, 637-642.
Report on the treatment of myelogenous leukemia with radium.—*Ibid.*, clxxvii, 873-874.
Cardiac dyspnea. [Abstr.]—*Canada Lancet*, Toronto, 1917, i, 392-395; also *New York M. J.* [etc.], 1917, cv, 693-694.
Recent advances in the study of heart disease and their significance to the general practitioner of medicine.—*Wisconsin M. J.*, Milwaukee, 1916-17, xv, 255-263.
Clinical studies on the respiration. III. A mechanical factor in the production of dyspnea in patients with cardiac disease.—*Arch. Int. Med.*, Chicago, 1917, xx, 433-442.

PEABODY, F. W., and MCCLURE, C. W.
Relation of vital capacity of lungs to clinical condition of patients with heart disease.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1954-1959.

PEABODY, F. W., and WENTWORTH, J. A.
Clinical studies on the respiration. IV. The vital capacity of the lungs and its relation to dyspnea.—*Arch. Int. Med.*, Chicago, 1917, xx, 443-467.

PEABODY, F. W., WENTWORTH, J. A., and BARKER, BERTHA I.
Clinical studies on the respiration. V. The basal metabolism and the minute-volume of patients with cardiac disease.—*Arch. Int. Med.*, Chicago, 1917, xx, 468-478.

PLAGGEMEYER, H. W.
Radical operation for vesico-vaginal fistula.—*Grace Hosp. Bull.*, Detroit, Mich., 1917-18, ii.
Epididymotomy.—*J. Mich. M. Soc.*, Grand Rapids, 1917, xvi, 266-270; also *Grace Hosp. Bull.*, Detroit, Mich., 1917-18, ii, 12-15.

PLASS, E. D., and WILSON, D. W.
Creatine and creatinine in whole blood and plasma.—*J. Biol. Chem.*, N. Y., 1917, xxix, 413-423.

QUINBY, W. C.
The action of diuretics on the denervated kidney.—*Am. J. Physiol.*, Bost., 1916-17, xlii, 593.
Pyelitis in children.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 591-593.

QINBY, W. C., and WINTERNITZ, M. C.
Experimental nephropathy in the dog: lesions produced by injections of the bacillus bronchisepticus into the renal artery.—*J. Urol.*, Balt., 1917, i, 139-154.

RANDALL, A.
The gross pathology of median bar formation.—*Ann. Surg.*, Phila., 1917, lxv, 471-475.
Median bars as found at autopsy.—*J. Urol.*, Balt., 1917, i, 383-404.
Epitome of the present treatment of syphilis.—*Therap. Gaz.*, Detroit, 1917, xli, 764-767.

RANDOLPH, R. L., and SCHMEISSER, H. C.
A clinical and pathological study of two cases of miliary tubercles of the choroid.—*Ophth. Rec.*, Chicago, 1917, xxvi, 1-9.

REMSEN, C. M.
Abscess of the brain; report of a case.—*Charlotte (N. C.) M. J.*, 1917, lxxvi, 67-69.

RICHARDSON, H. B.
Familial epistaxis; a case report.—*Am. J. M. Sc.*, Phila., 1917, cliv, 95-99.

RIGGS, T. F.
Syphilitic pseudoparalysis (Parrot's disease).—*Journal-Lancet*, Minneap., 1917, n. s., xxxvii, 636-638.

RIVERS, T. M., SYDENSTRICKER, V. P. W., and MASON, V. R.
Transfusion of blood by the citrate method.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1677-1680.

ROUS, P., and JONES, F. S.
The phagocytic power of connective tissue cells.—*J. Exper. M.*, Balt., 1917, xxv, 189-193; also *Stud. Rockefeller Inst. M. Research*, N. Y., 1917, xxvi, 97-101.

ROUS, P., and ROBERTSON, O. H.
The normal fate of erythrocytes. I. The findings in healthy animals.—*J. Exper. M.*, Balt., 1917, xxv, 651-663; also *Stud. Rockefeller Inst. M. Research*, N. Y., 1917, xxvii, 163-176.
The normal fate of erythrocytes. II. Blood destruction in plethoric animals and in animals with a simple anemia.—*Ibid.*, 665-673; also *Ibid.*, 177-185.

ROWNTREE, L. G.
The treatment of nephritis.—*In:* Practical treatment. (Musser & Kelly.) 1917, iv, 747-785.
The cause, pathological physiology, and treatment of the more important clinical manifestations of nephritis.—*Ibid.*, 800-855.
Renal function in health and disease.—*In:* Practical treatment. (Musser & Kelly.) 1917, iv, 786-799.
Uremia, etiology, types and diagnosis.—*Journal-Lancet*, Minneap., 1917, xxxvii, 491-495; also *J. Iowa State M. Soc.*, Des Moines, 1917, vii, 1-5.
The diagnosis and treatment of acidosis.—*St. Paul M. J.*, St. Paul, Minn., 1917, xix, 1-9.

ROWNTREE, L. G., WATERS, C. A., and BAYNE-JONES, S.
Roentgenography of the lungs. Roentgenographic studies in living animals after intratracheal injection of iodoform emulsion.—*Arch. Int. Med.*, Chicago, 1917, xix, 538-549.

RUSHMORE, S.
Progress in gynecology.—*Boston M. & S. J.*, 1917, clxxvi, 700-707; clxxvii, 726-739.

SABIN, FLORENCE R.
The method of growth of the lymphatic system.—*Harvey Lect.*, 1915-16, Phila. & London, 1917, 124-145.
Origin and development of the primitive vessels of the chick and of the pig.—*Contrib. Embryol.* (Carnegie Inst.), Wash., 1917, vi, 61-124.
Preliminary note on the differentiation of angioblasts and the method by which they produce blood-vessels, blood plasma and red blood-cells as seen in the living chick.—*Anat. Record*, Phila., 1917, xiii, 199-204.

SAMPSON, J. A.
The variations in the blood supply of the ovary and their possible operative importance.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxiv, 339-350.

SELLARDS, A. W.
The principles of acidosis and clinical methods for its study.—*Harvard University Press*, Cambridge, 1917, 117 p., 8°.
Bacterial cultures of human spleens removed by surgical operation.—*N. Orl. M. & S. J.*, 1917, lxix, 502-518.

SELLARDS, A. W., and MINOT, G. R.
The preparation of hemoglobin for clinical investigations.—*J. Med. Research*, Bost., 1917, xxxvii, 161-170.

SHALLENBERGER, W. F.
Gynecologic origin of nervous manifestations.—*South. M. J.*, Birmingham, Ala., 1917, x, 797-799.

SHARPE, W.
The operative treatment of hydrocephalus; a preliminary report on forty-one patients.—*Am. J. M. Sc.*, Phila., 1917, cliii, 563-571.
The pressure signs of certain intracranial conditions observable in the fundus of the eye.—*Arch. Ophth.*, N. Y., 1917, xlvi, 320-330.
Observations regarding the operative treatment of selected cases of cerebral spastic paralysis due to an intracranial hemorrhage at birth.—*Internat. Clin.*, Phila., 1917, 27. s., iii, 272-282; also *Proc. Alienists & Neurol. Am.*, Chicago, 1917, vi, 75-83.
Observations regarding head injuries.—*Internat. J. Surg.*, N. Y., 1917, xxx, 135-143.
The field of neurological surgery.—*Med. Rec.*, N. Y., 1917, xcii, 711-717.
Recent advances in neurological surgery and especially in the diagnosis and treatment of brain injuries.—*Proc. Connect. M. Soc.*, New Haven, 1917, cxxv, 140-159.
Observations regarding the operation of cranial decompression for certain intracranial conditions.—*Virginia M. Semi-Month.*, Richmond, 1916-17, xxi, 523-530; 553-558.

SHARPE, W., and FARRELL, B. P.
Cerebral spastic paralysis due to hemorrhage. A further report of the first sixty-five cases of cranial decompression for selected cases.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1056-1057.

SHARPE, W., and WYETH, J. A.
The field of neurological surgery in a general hospital.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxiv, 29-36.

SHOHL, A. T., and JANNEY, J. H.
The growth of bacillus coli in urine at varying hydrogen-ion concentrations.—*J. Urol.*, Balt., 1917, i, 211-229.

SISSON, W. R.
Experimental studies of the intestinal flora.—*Am. J. Dis. Child.*, Chicago, 1917, xiii, 117-127.

SISSON, W. R., WOLBACH, S. B., and MEIER, F. C.
A new pathogenic sporotrichum found in a case of acute arthritis of the knee following injury (Sporotrichum councilmani).—*J. Med. Research*, Bost., 1917, xxxvi, 337-355.

SLEMONS, J. M.
How closely do the Wassermann reaction and the placental histology agree in the diagnosis of syphilis.—*Am. J. M. Sc.*, Phila., 1917, cliii, 212-218.
A case of fetus amorphus anideus, from Department of Obstetrics and Gynecology, Yale Medical School.—*Am. J. Obst.*, N. Y., 1917, lxxv, 749-752.
Value of blood pressure determinations in the practice of obstetrics.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 778-781.
What is gained by the union of obstetrics and gynecology in a teaching hospital?—*N. Y. State J. M.*, N. Y., 1917, xvii, 307-311.
The care of prospective mothers.—*Outlook*, N. Y., 1917, cxvi, 110-111.

SLEMONS, J. M., and BOGERT, L. J.
The uric acid content of maternal and fetal blood.—*J. Biol. Chem.*, Balt., 1917, xxxii, 63-69.

SLEMONS, J. M., and CURTIS, C. S.
Cholesterol in the blood of mother and fetus: a preliminary note.—*Am. J. Obst.*, N. Y., 1917, lxxv, 569-575.

SLEMONS, J. M., and MORRISS, W. H.
The non-protein nitrogen and urea in the maternal and the fetal blood at the time of birth. [Abstr.]—*South. M. J.*, Birmingham, Ala., 1917, x, 160; 173.

SLOAN, M. F.
The urgent need of hospital facilities for tuberculous negroes.—*South. M. J.*, Birmingham, Ala., 1917, x, 654-662.

SMITH, W. H.
Reorganization of the civilian hospital on a war basis. War department does not expect civil hospitals to care for wounded soldiers and sailors—their duty to release scientific staffs for war, and to care for civilian population—orders relating to interns and nurses.—*Mod. Hosp.*, St. Louis, 1917, ix, 262-266.

SPRUNT, T. P., and BARKER, L. F.
The treatment of some cases of so-called "pernicious" anemia: a regimen that has been found helpful.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1919-1927.

STEARNS, T., WHIPPLE, G. H., and COOKE, J. V.
Proteose intoxication and injury of body protein. II. The metabolism of dogs with duodenal obstruction and isolated loops of intestine.—*J. Exper. M.*, Balt., 1917, xxv, 479-494.

STEINER, W. R.
Hereditary hemorrhagic telangiectasia, with report of three families and a review of those previously recorded.—*Arch. Int. Med.*, Chicago, 1917, xix, 194-219.

STEVENS, A. R.
Unique roentgenographic demonstration of a uric acid calculus.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1903.
The diagnosis of surgical lesions of the kidney and ureter.—*New York M. J.* [etc.], 1917, cvi, 395-398.

STONE, H. B.
The relation of fistula in ano to tubercle infection.—*Am. Rev. Tuberc.*, Balt., 1917, i, 548-559.

STONE, H. B., and DAVIS, D. M.
Studies on the development of toxicity in intestinal secretion.—*J. Exper. Med.*, Balt., 1917, xxvi, 687-691.

STONE, H. B., and YOUNG, H. H.
The operative treatment of urethrorectal fistula. Presentation of a method of radical cure.—*J. Urol.*, Balt., 1917, i, 289-303.

STROUSE, S.
Essential principles in the feeding of the sick.—*Interstate M. J.*, St. Louis, 1917, xxiv, 461-463.
The diagnosis of early acute pulmonary tuberculosis.—*Med. Clin.*, Chicago, 1917, ii, 745-760.
Inanition in the treatment of diabetes mellitus. Historical review. Principles involved in the "Allen Treatment." Selection of cases. Prognosis with present methods.—*Ibid.*, 1916-17, ii, 999-1006.

STROUSE, S., and PERRY, MAUD A.
Food for the sick. A manual for physicians and patients.—W. B. Saunders Co., Phila. & Lond., 1917, 270 p., 8°.

SYDENSTRICKER, V. P. W., MASON, V. R., and RIVERS, T. M.
Transfusion of blood by the citrate method.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1677-1680.

THAYER, W. S.
Scholarship in medicine.—*Boston M. & S. J.*, 1917, clxxvi, 519-524.
Observations on some of the commoner deviations from the ordinary met with in the examination of the heart of supposedly normal individuals.—*Med. Rec.*, N. Y., 1917, xci, 617-623; also [Abstr.] *New York M. J.* [etc.], 1917, cv, 603-604.
The management of the early stages of hypertensive cardio-vascular disease.—*South. M. J.*, Birmingham, Ala., 1917, x, 367-377.
Teaching and practice.—*Tr. Cong. Am. Phys. & Surg.* (1916), N. Haven, 1917, x, 77-98.
Medicine.—*In:* Science and learning in France. [Chicago.] 1917, 187-195.

TINKER, M. B.
Co-operation in medicine.—*New York State J. M.*, N. Y., 1917, xvii, 218-222.

VANDERHOOF, D.
Dilated duodenum, with especial reference to chronic duodenal obstruction in visceroptosis.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 510-514.
Syphilis as a factor in the production of cardio-vascular-renal disease.—*South. M. J.*, Birmingham, Ala., 1917, x, 100-103.

VEST, C. W.
Relation of the glands of internal secretion to the female pelvic organs.—*Am. J. Obst.*, N. Y., 1917, lxxv, 366-372; also *Bull. Med. & Chir. Fac. Maryland*, 1916-17, ix, 102-107; also [Abstr.] *South. M. J.*, Birmingham, Ala., 1917, x, 817.
Streptococcus septicemia with metastatic infection in one eye.—*South. M. J.*, Birmingham, Ala., 1917, x, 740-742.

WALKER, G., and FINNEY, J. M. T.
Abrogate the patent on salvarsan. (Letter.)—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1572-1573.

WALTERS, A. L., and KOCH, E. W.
Pharmacological studies of the ipecac alkaloids and some synthetic derivatives of cephaeline. I. Studies on toxicity.—*J. Pharmacol. & Exper. Therap.*, Balt., 1917-18, x, 73-81.

WALTERS, A. L., ECKLER, C. R., and KOCH, E. W.
Pharmacological studies of the ipecac alkaloids and some synthetic derivatives of cephaeline. II. Studies on emetic effect and irritant action.—*J. Pharmacol. & Exper. Therap.*, Balt., 1917-18, x, 185-197.

WALTERS, A. L., BAKER, W. F., and KOCH, E. W.
Pharmacological studies of the ipecac alkaloids and some synthetic derivatives of cephaeline. III. Studies on protozoöcidal and bactericidal action.—*J. Pharmacol. & Exper. Therap.*, Balt., 1917-18, x, 341-364.

WARFIELD, L. M.
Classification of the chronic high blood-pressure cases.—*Am. J. M. Sc.*, Phila., 1917, cliv, 414-424.
The significance of high pulse pressure.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 824-826.
The etiology of arteriosclerosis.—*J. Lab. & Clin. Med.*, Balt., 1917-18, iii, 115-117.
Blood group determinations as a preliminary step to blood transfusion.—*Wisconsin M. J.*, Milwaukee, 1917, xv, 376-379.
Lactosuria: case presenting unusual feature; clinical report.—*Ibid.*, 1917-18, xvi, 63-64.

WATERS, C. A., BAYNE-JONES, S., and ROWNTREE, L. G.
Roentgenography of the lungs. Roentgenographic studies in living animals after intratracheal injection of iodoform emulsion.—*Arch. Int. Med.*, Chicago, 1917, xix, 538-549.

WATERS, C. A., and DOUB, H. P.
The roentgen diagnosis of polypi of the maxillary sinuses.—*Am. J. Roentgenol.*, N. Y., 1917, iv, 470-472.

WATSON, E. M.
Renal pain, modern methods of diagnosis and their interpretation.—*Buffalo M. J.*, 1917, lxxiii, 1-6.
A study of the vesical orifices following perineal prostatectomy.—*J. Urol.*, Balt., 1917, i, 543-557.
Prostatic hypertrophy with tabes. Its diagnosis and management from the standpoint of urinary obstruction.—*New York M. J.* [etc.], 1917, cvi, 448-449.
The causes of urinary frequency in young men.—*New York State J. M.*, N. Y., 1917, xvii, 552-553.
Lesions of the posterior urethra: their symptomatology, diagnosis, and treatment.—*Med. Rec.*, N. Y., 1917, xcii, 583-585.

WELCH, W. H.
Medical education in the United States.—*Harvey Lect.*, 1915-16, Phila. & Lond., 1917, 366-382.
The Carrel-Dakin treatment. (Letter.)—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1994.

WHIPPLE, G. H.
Animal experimentation and medical progress; an argument in support of a bill now before the state legislature.—*Calif. State J. M.*, San Fran., 1917, xv, 68-70.

WHIPPLE, G. H., and COOKE, J. V.
Proteose intoxications and injury of body protein. II. The metabolism of fasting dogs following proteose injections.—*J. Exper. M.*, Balt., 1917, xxv, 461-477.

WHIPPLE, G. H., COOKE, J. V., and STEARNS, T.
Proteose intoxications and injury of body protein. II. The metabolism of dogs with duodenal obstruction and isolated loops of intestine.—*J. Exper. M.*, Balt., 1917, xxv, 479-494.

WHIPPLE, G. H., and HOOPER, C. W.
Bile pigment metabolism. III. Bile pigment output and blood feeding.—*Am. J. Physiol.*, Balt., 1917, xlii, 256-263.
Bile pigment metabolism. IV. Influence of fresh bile feeding upon whole bile and bile pigment secretion.—*Ibid.*, 264-279.
Bile pigment metabolism. VI. Bile pigment output influenced by the Eck fistula.—*Ibid.*, 1916-17, 544-557.
Bile pigment metabolism. VII. Bile pigment output influenced by hemoglobin injections, anemia and blood regeneration.—*Ibid.*, 1917, xliii, 258-274.
Bile pigment metabolism. VIII. Bile pigment output influenced by hemoglobin injection; splenectomy and anemia.—*Ibid.*, 275-289.
Bile pigment metabolism. IX. Bile pigment output influenced by hemoglobin injection in the combined Eck bile fistula dog.—*Ibid.*, 290-297.

WHIPPLE, G. H., and HURWITZ, S. H.
Studies on blood proteins. II. The albumin-globulin ratio in experimental intoxications and infections.—*J. Exper. M.*, Balt., 1917, xxv, 231-252.

WILLIAMS, J. W.
Obstetrics.—*D. Appleton & Co.*, N. Y. & Lond., 1917, 4th ed., 1029 p., 8°.
Why is the art of obstetrics so poorly practised?—*Long Island M. J.*, Brooklyn, 1917, xi, 169-178.
The abuse of Cæsarean section.—*Surg., Gynec. & Obst.*, Chicago, 1917, xxv, 194-201.
Histological study of 50 uteri removed at Cæsarean section.—*Tr. Am. Gynec. Soc.*, 1917, xlii.

WINTERNITZ, M. C.
Autopsies—their value, methods of obtaining and protection of the hospital.—*Mod. Hosp.*, St. Louis, 1917, viii, 36-43.

WINTERNITZ, M. C., and QUINBY, W. C.
Experimental nephropathy in the dog: lesions produced by injections of the bacillus bronchisepticus into the renal artery.—*J. Urol.*, Balt., 1917, i, 139-154.

WOLFSOHN, J. M.
The treatment of syphilis of the central nervous system with intraspinal injections of mercurialized serum.—*Am. J. M. Sc.*, Phila., 1917, cliii, 265-273.

WOOLLEY, P. G.
A series of ruptured aortic aneurysms.—*Am. J. Syph.*, St. Louis, 1917, i, 426-449.
Aortic aneurysms and dilatations.—*Ibid.*, 582-605.
Cases of hypertrophic cirrhosis of the liver.—*Ibid.*, 649-662.
Cardiac aneurisms.—*J. Lab. & Clin. M.*, St. Louis, 1916-17, ii, 221-240.
Cases of unusual aneurisms.—*Ibid.*, 525-535.
The thymus—a summary.—*Ibid.*, 632-637.
A case of congenital cystic kidney in which a tuberculous process was superimposed.—*Ibid.*, 1917, iii, 55-58.
Recent literature on the pathology of cancer.—*Ohio M. J.*, Columbus, 1917, xiii, 412-414.

WOOLLEY, P. G., and RANSOHOFF, J. L.
Operative cure of congenital pyloric stenosis: thymic death after seven months; necropsy.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1543-1544.

YATES, J. L., and BUNTING, C. H.
Results of treatment in Hodgkin's disease.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 747-751; also *Wisconsin M. J.*, Milwaukee, 1916-17, xv, 453-463.

YOUNG, H. H.
The use of radium and the punch operation in desperate cases of enlarged prostate.—*Ann. Surg.*, Phila., 1917, lxv, 633-641.
The use of radium in cancer of the prostate and bladder: a presentation of new instruments and new methods of use.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 1174-1177.
Carcinoma of the prostate: an improved technic for radical excision with preservation of urinary control.—*Ibid.*, lxix, 1591-1597.
Foreword.—*J. Urol.*, Balt., 1917, i, 1-2.
The organization of a special surgical unit in a general hospital. The James Buchanan Brady Urological Institute.—*Med. Rec.* N. Y., 1917, xci, 8-13.
The relation of chronic infections of the genitourinary tract to obscure internal disorders.—*New York M. J.* [etc.], 1917, cv, 49-54.
The use of radium in cancer of the prostate and bladder.—*Radium*, Pittsburgh, 1917, ix, 47-48.

YOUNG, H. H., and COLSTON, J. A. C.
Injuries to the pancreas following operations on the right kidney.—*J. Urol.*, Balt., 1917, i, 179-191.

YOUNG, H. H., and DAVIS, E. G.
Double ureter and kidney, with calculous pyonephrosis of one half; cure by resection. The embryology and surgery of double ureter and kidney.—*J. Urol.*, Balt., 1917, i, 17-32.

YOUNG, H. H., and FRONTZ, W. A.
Preliminary treatment for prostatectomy in unfavorable cases.—*J. Am. M. Ass.*, Chicago, 1917, lxviii, 526-530; also [Abstr.] *South. M. J.* Birmingham, Ala., 1917, x, 431-432.

YOUNG, H. H., and STONE, H. B.
The operative treatment of urethro-rectal fistula. Presentation of a method of radical cure.—*J. Urol.*, Balt., 1917, i, 289-303.

ZADEK, I., and BARNETT, E. L.
The importance of the ligaments of the ankle in correction of congenital clubfoot.—*J. Am. M. Ass.*, Chicago, 1917, lxix, 1057-1058.

BOOKS RECEIVED.

A Handbook of Practical Treatment. By Many Writers. Edited by John H. Musser, Jr., B. S., M. D., and Thomas C. Kelly, A. M., M. D. Vol. IV. 1917. 8°. 1000 pages. W. B. Saunders Company, Philadelphia and London.

Complete Index to Volumes I, II, III, and IV of Musser and Kelly's Practical Treatment. 1917. 8°. 218 pages. W. B. Saunders Company, Philadelphia and London.

An Epitome of Mental Disorders. A Practical Guide to Ætiology, Diagnosis, and Treatment. For Practitioners, Asylum, and R. A. M. C. Medical Officers. By E. Fryer Ballard, M. B., B. S. (Lond.) 1917. 8°. 211 pages. P. Blakiston's Son & Co., Philadelphia.

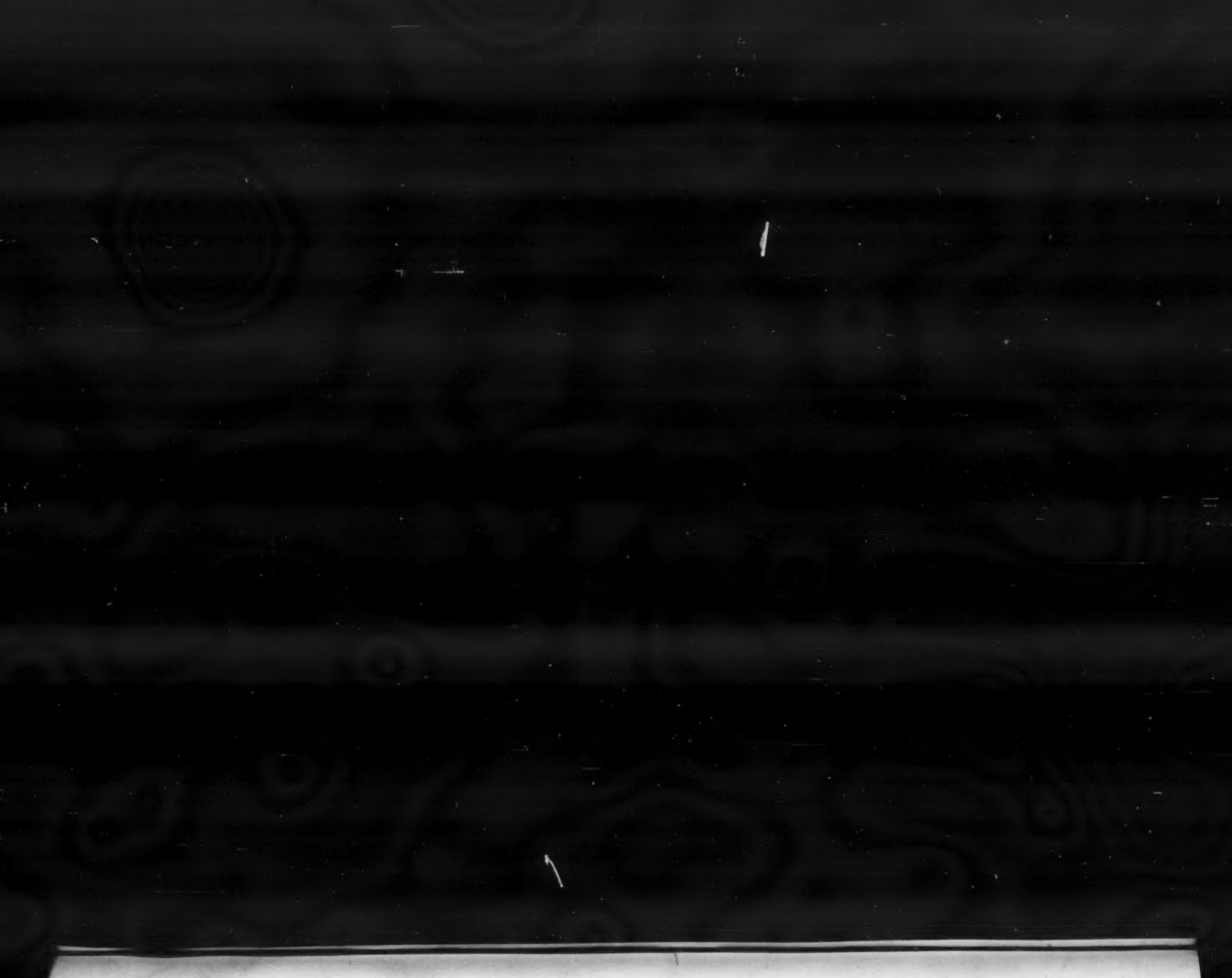
Nutrition and Clinical Dietetics. By Herbert S. Carter, M. A., M. D., Paul E. Howe, M. A., Ph. D., Howard H. Mason, A. B., M. D. 1917. 8°. 646 pages. Lea and Febiger, Philadelphia and New York.

The Diagnostics and Treatment of Tropical Diseases. By E. R. Stitt, A. B., Ph. G., M. D. Second edition, revised and enlarged. With 117 illustrations. 1917. 16°. 534 pages. P. Blakiston's Son & Co., Philadelphia.

"First Aid" to the Injured and Sick; an Advanced Ambulance Handbook. By F. J. Warwick, B. A., M. B. Contab., M. R. C. S., L. S. A., A. K. C. Lond., and A. C. Tuonstall, M. D., C. M., F. R. C. S., L. R. C. P. Ed. Tenth edition, revised. 1917. 16° 246 pages. William Wood & Co., New York.

Fractures of the Lower Extremity or Base of the Radius. By Lewis Stephen Pilcher, A. M., M. D., LL. D. 132 illustrations. 1917. 8°. 116 pages. J. B. Lippincott Company, Philadelphia and London.

Pathogenic Microörganisms. A Practical Manual for Students, Physicians and Health Officers. By William Hallock Park, M. D., and Anna Wessels Williams, M. D., assisted by Charles Krumwiede, Jr., M. D. Sixth edition, enlarged and thoroughly revised. With 209 engravings and 9 full-page plates. 1917. 8°. 709 pages. Lea and Febiger, New York and Philadelphia.

The Fundus Oculi of Birds, Especially as Viewed by the Opthalmoscope. A Study in Comparative Anatomy and Physiology. By Casey Albert Wood. Illustrated by 145 drawings in the text; also by 61 colored paintings prepared for this work by Arthur W. Head, F. Z. S. 1917. 180 pages. The Lakeside Press, Chicago.

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